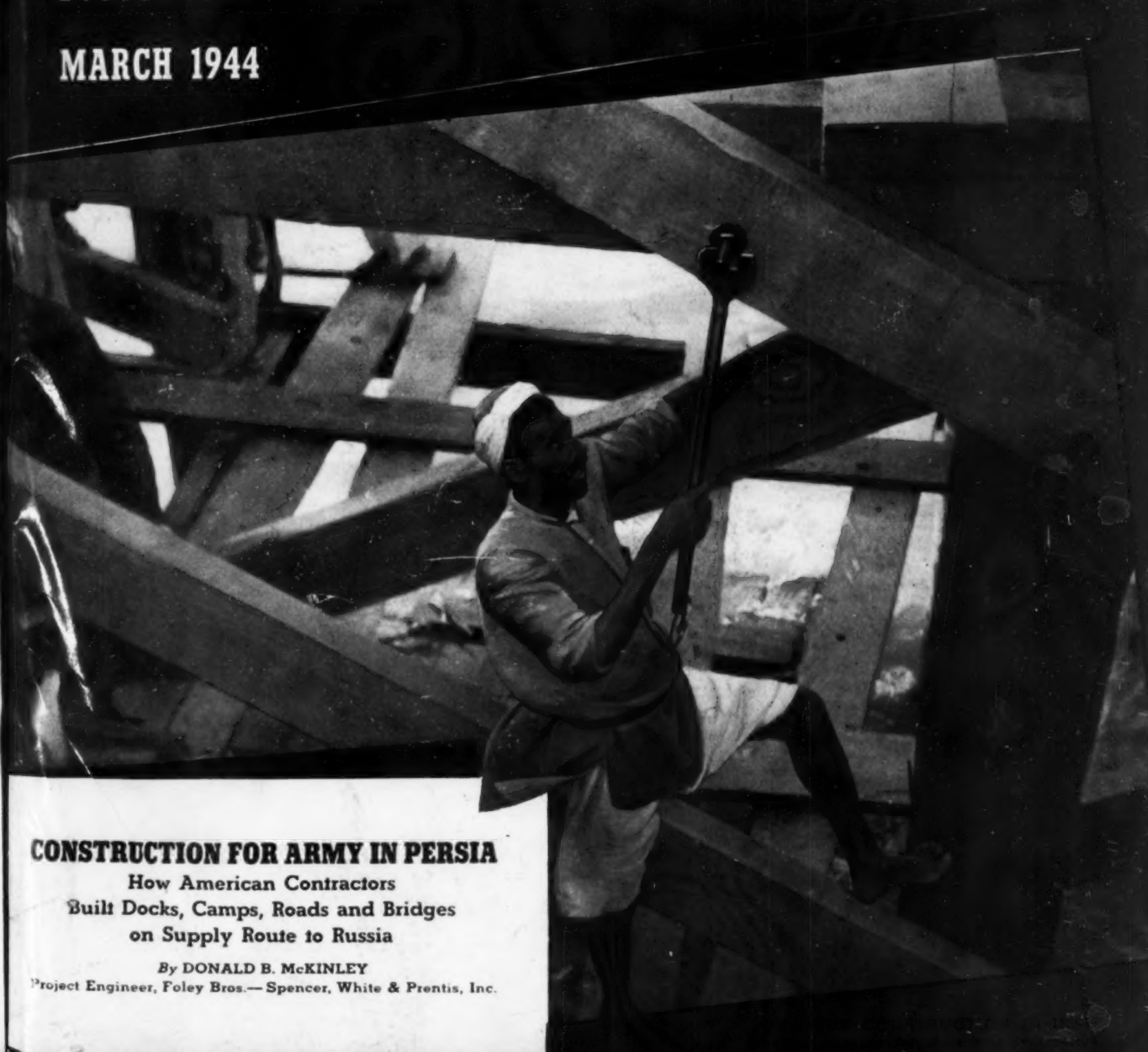


A PICTORIAL SURVEY OF CURRENT PRACTICE, EQUIPMENT AND MATERIALS

Construction Methods

McGraw-Hill Publishing Company, Inc. • PRICE 20 CENTS

MARCH 1944



CONSTRUCTION FOR ARMY IN PERSIA

How American Contractors
Built Docks, Camps, Roads and Bridges
on Supply Route to Russia

By DONALD B. McKINLEY

Project Engineer, Foley Bros.—Spencer, White & Prentiss, Inc.



"Flying" bulldozers and scrapers will quickly repair this bombed airfield.



*'Come on—Back the Attack
—Buy War Bonds!'*

Bulldozers That Fly

An airfield is bombed, but within a few minutes after the "all clear" signal is given Yankee engineers are at work repairing the damage with sturdy bulldozer and scraper units that are small enough to be flown anywhere by transport plane or glider. But repairing airfields is not the only job performed by these husky units—they also help build new airfields and vital supply routes, prepare camp sites, and perform many other chores so important to Victory.

Much of the steel used in these "flying" earthmovers is furnished by Inland to the La Plant-Choate Manufacturing Co., Cedar Rapids, Iowa. Producing steel for tough construction equipment is an old assignment to Inland steelmakers and metallurgists. A large tonnage of the steel shipped for this purpose before the war was Inland Hi-Steel—the steel that builds stronger and saves weight—the steel that will again be used for peacetime machinery when released from the demands of war.



INLAND STEEL COMPANY

38 S. Dearborn St., Chicago 3, Ill.

Sales Offices: Milwaukee • Detroit • St. Paul • St. Louis • Kansas City • Cincinnati • New York

CURRENT JOBS

... and Who's Doing Them

BUILDINGS

Public—Navy contract for advanced base depot at Port Hueneme, Calif., was awarded to **Raymond Concrete Pile Co., Morrison-Knudsen Co., and Turner Construction Co.**, of New York, N. Y., for \$44,777,375. Another Navy contract for \$22,500,000 for advanced base depot at Davisville, R. I., went to **Geo. A. Fuller Co.**, and **Merritt-Chapman & Scott Corp.**, of New York, N. Y. Alumina-clay plant at Salem, Ore., will be built for \$4,500,000 by **Chemical Construction Corp.**, of New York, N. Y. **James I. Barnes Construction Co.**, of Santa Monica, Calif., has \$2,262,000 Navy contract for facilities at Terminal Island receiving station. **Thorgersen & Erickson Co.**, of Chicago, Ill., will build factory and office in Illinois for an estimated \$2,000,000. **Robert McCarthy Co.**, of San Francisco, Calif., has \$1,777,956 contract for 1,000 family dwelling units at Vallejo. Navy contract for barracks at Klamath Falls, Ore., was awarded to **Brennan & Cahoon**, of Pendleton, for \$1,507,261. Another Navy contract for buildings at Patuxent River, Md., went to **John A. Johnson Contracting Corp.**, of Brooklyn, N. Y., for \$1,398,000.

Industrial—Plant at St. Clair, Mich., will be rebuilt by **Bryant & Detwiler Co.**, of Detroit, for \$2,000,000. **A. L. Jackson Co.**, of Chicago, Ill., will build factory facilities at Lincoln, Neb., for \$4,500,000. **Austin Co.**, of Cleveland, Ohio, has \$5,000,000 contract for plant at Miami, Okla. Plant at Carlsbad, N. M., will be built by **C. C. Moore & Co.**, of San Francisco, Calif., for \$1,000,000.

Commercial—Contract for housing unit at Houston, Tex., was awarded to **Russ Mitchell, Inc.**, of Houston, for \$1,800,000. **Beliveau Construction Co.**, of Alhambra, Calif., will build 62 dwellings in Los Angeles, for \$1,500,000. **Woodland Homes, Inc.**, of Akron, Ohio, is building 200 dwellings at Cuyahoga Falls for \$1,000,000. **Carver Housing Corp.**, of Baltimore, Md., is building 21 apartment buildings in Baltimore for \$1,000,000. **Murphy Bros.**, of Beverly Hills, Calif., will build 17 apartment buildings in San Pedro, for \$910,000.

HEAVY CONSTRUCTION

Oil pipeline between Wyoming and Montana will be built by **Stanoline Pipe Line Co.**, of Casper, Wyo., for \$4,200,000. **J. Rich Steers, Inc.**, of New York, N. Y., has \$2,660,000 Navy contract for ships pier in New Jersey. Army contract for firing-in range at Matagorda, Tex., was awarded to **Brown & Root, Inc.**, of Houston, for \$1,011,404. **Horace W. Williams Co.**, of New Orleans, La., will build drydock at Galveston, Tex., for \$1,000,000. **McLean Contracting Co.**, of Baltimore, Md., has \$1,178,000 Navy contract for waterfront expansion at Norfolk, Va. Airport runways at Alturas, Calif., will be built by **Kuckenburg Construction Co.**, of Portland, Ore., for \$1,884,536. Low bidder on \$1,354,177 airport contract at Urbana, Ill., is **Johnson Green Co.**, of Ann Arbor, Mich., and **Cooke Contracting Co.**, of Detroit, Mich.

HIGHWAYS

Among recent highway contract awards are the following: Florida: \$250,819 to **Cleary Bros. Construction Co.**, of West Palm Beach. Illinois: \$294,386 to **The Arcole-Midwest Corp.**, of Chicago. Louisiana: \$450,115 to **W. R. Aldrich & Co.**, of Baton Rouge. Maryland: \$269,391 to **C. J. Langenfelder & Son**, of Rosedale. Oregon: \$248,500 to **Empire Construction Co.**, of Portland. Texas: \$191,500 to **L. Vernon Miller**, of Houston. Washington: \$293,105 to **Northwest Construction Co.**, of Seattle.

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A Pictorial Survey of Current Practice, Equipment and Materials

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MARCH, 1944

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DETROIT

THE *How* OF IT

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

- How **LUMBER CARRIER** was made safer by moving operator's seat forward —p. 57
- How **AMERICAN CONTRACTORS IN PERSIA** built docks, camps, roads and bridges for Army —p. 60
- How **PREFABRICATED WOOD BARGES** were assembled and launched on Persian Gulf —p. 63
- How **TEAKWOOD AND MAHOGANY PILING** was adzed and spliced for use in dock construction —p. 63
- How **HOUSES IN IRAN** were built by two methods —p. 65
- How **TRUCK TRANSPORT SERVICE** was maintained by contractor on Army airfield job —p. 66
- How **TWO-MAN FLOAT** ironed out longitudinal irregularities in surface of pavement —p. 67
- How **MAINTENANCE METHODS** prolong life of concrete vibrators —p. 68
- How **ARMY ENGINEERS** perform manifold tasks with heavy-duty construction equipment —p. 70
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- How **THREE-PLATFORM JUMBO** was used to drive rock tunnel —p. 81
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From

To

Signed

Disposal of Government Inventories

HOW to dispose of government surpluses when the war ends need not be an insuperable problem—if we face it promptly and intelligently. But if we do not, peacetime markets may be disrupted, government funds wasted, production discouraged, and reconversion of the whole economy to peace seriously hampered.

What we need most in order to attack the problem is estimates of how much surplus there will be, in what types of goods, and where.

At the war's end, government inventory of war goods is likely to total around 60 billion dollars. Most of this will consist of aircraft, ships, and other ordnance. Only some 15 billion dollars or less will be in food, clothing, trucks, tools, chemicals, medical supplies, transportation, engineering and communication equipment, and other goods for which there is a civilian market.

In addition, war contractors will have about 10 billion dollars of inventories, the bulk in specialized raw materials, goods in process, and finished products. Only about one-fifth of the total, or some 2 billion dollars, will be marketable or usable for civilian purposes. While the government takes over the usable inventory, the ex-war-contractors will have to build up their stocks for peacetime production, so that on balance, they will not be disposing of usable inventories in large volume.

Not even all of the usable war-end inventory will be "surplus" for sale to civilians in competition with new production. Some of it will be needed by the sizable peacetime Army and Navy we are likely to maintain, and such additional items as can be stored without serious deterioration or obsolescence will be held against possible future war emergencies. Some of it will be disposed of abroad. And up to half of it will be abroad and may be sold there or used for relief.

After allowing for these factors, the war supplies to be disposed of in our own markets probably will be less than 10 billion dollars (cost basis). While the total is not overwhelming—the equivalent of two months' retail sales—in certain lines the surplus will be several years', instead of a few months', normal supply. In particular, the volume of scrap metals available from otherwise unusable munitions will present a problem.

A great deal can be done now to reduce the size of the postwar surpluses by achieving a better balance between military needs and supplies and avoiding excessive inventories of particular raw materials or finished goods. This work needs to be pressed, not only to simplify our transition to peace but also to prevent wasting productive energies during the war. Furthermore, when the war ends on one front, inventories of war materiel should be worked down to the reduced scale of remaining military activity.

We cannot develop programs of action until we know approximately how much of each type of item is to be sold, and where and when it will be available. Wide margins of error are inevitable as

long as large-scale procurement and large-scale consumption are still taking place; yet such information is essential and must be developed. Indeed, improved inventory records and estimates are badly needed for the conduct of the war as well as for managing the surpluses after hostilities cease.

In decisions on the disposal of war-goods inventories, the public interest must be the prime consideration. Proposals that none of these goods should be sold domestically because of competition with new production obviously are untenable. Everything that is not needed by the Armed Services or for other special purposes should be disposed of ultimately. The real problem is not whether surpluses should be sold, but rather to whom, at what price, and at what time the sale should be effected.

In the distribution of such large quantities of goods, we believe that established trade channels should be used wherever possible. Otherwise, we shall witness widespread speculation in war goods and the mushroom growth of inefficient and disruptive fly-by-night distributors. This will benefit only a few speculators and will discourage legitimate producers and distributors from making their normal commitments.

All war contractors should have the privilege of retaining those inventories for which they are willing to pay actual cost or a fair price negotiated with the government procurement agency. The balance of the inventories in the hands of war producers should be assembled by the government and sold in an organized manner. It is of great importance that the plants be cleared of these inventories at once so that the process of conversion to peacetime operation can proceed without further delay. To accomplish this, preparations must be made before the end of the war for speedy determination of the inventories to be moved and for a huge volume of storage space to accommodate them.

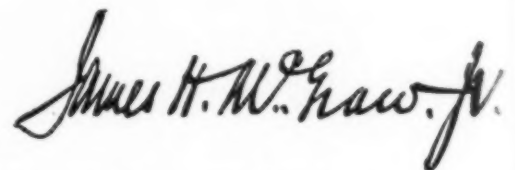
The price which can be realized and the timing of sale are closely related. Certainly the best prices will not be secured if the government attempts to dispose of large supplies of material and products suddenly without regard to market conditions. Most businessmen rightly favor an early transfer of surplus inventories from government to private ownership. But, they also realize that if all the surpluses are dumped indiscriminately as they become available, many markets will be badly depressed, and the resulting low prices will bring lower production. If this depression effect becomes general, as it easily can, it will be costly to the nation in terms of jobs, income, and goods.

In industries in which production is inadequate to meet postwar demands, an immediate sale of government inventories can prevent inflated prices and preserve balanced market conditions. In cases in which the surpluses are large in relation to annual production, the disposition can be scheduled over a period of years. Generally, however, it will be best to clear the surpluses as quickly as orderly sale can be accomplished rather than to leave them as a continuing threat overhanging the market.

Most industries can, and should, take the disposal process in their stride without special dispensations from the government. In this connection, it should be noted that the tax provisions for carry-back of losses and excess profit credits after the war greatly increase the possibilities for speedy disposal of surpluses without serious injury to producers.

There will be some industries, however, in which the postwar surplus is so large that it would practically saturate the market for years to come. The problem of these industries is further complicated by their wartime expansion of capacity many fold in excess of peacetime requirements. These lines of production are, moreover, crucial for our national defense. Aircraft and shipbuilding are cases in point. Each of these situations calls for careful study and discussion by all concerned to devise means to keep alive the necessary production organizations, the research effort, and the spirit of enterprise. Insofar as possible, the individual manufacturers should work out their own salvation in the conversion to peacetime markets. They can do this by taking on new lines, by increasing their production efficiency, and by developing technical improvements which make the existing inventories obsolete. But they still will need some kind of government protection or assistance while the huge surpluses are being worked off. It is most important, however, that such protection or subsidy be limited to a period of three to five years. It must not become permanent unless it is really essential for our national security.

The disposal of surplus inventories is part of the whole process of demobilization of the war effort and conversion to peace. If this process is to be accomplished with minimum dislocation and injury to our economy, it will have to be directed by a central agency which has developed adequate information service and is in position to coordinate the policies of the Armed Services and the other interested executive branches of the government. This agency should draw freely on the knowledge of businessmen in the specialized problems of marketing surpluses in each industry. It should formulate definite programs of inventory disposal for all industries in which the problem is acute; and it should make these programs public as soon as possible, so that business can plan for the future with confidence. In large measure, the success with which we make the economic transition to peace will depend on the quality of government administration in the process of industrial demobilization. We shall need better organization for the transition to peace than we had in mobilization for war if we are to avoid needless unemployment, loss of production, and frustration of business enterprise.



President, McGraw-Hill Publishing Company, Inc.

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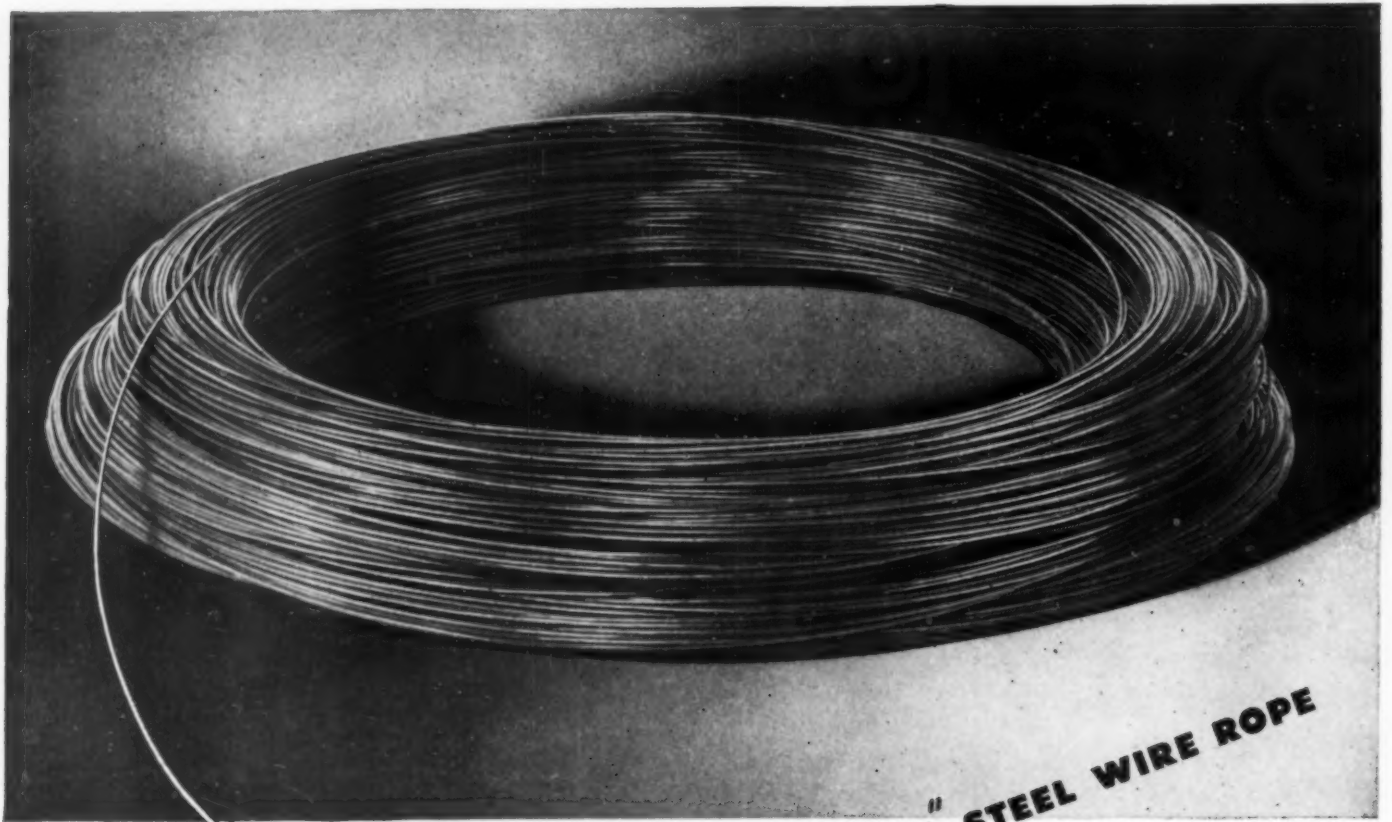
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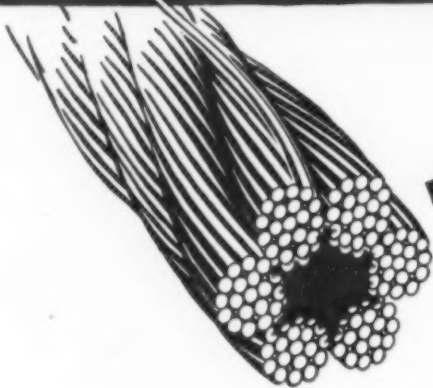
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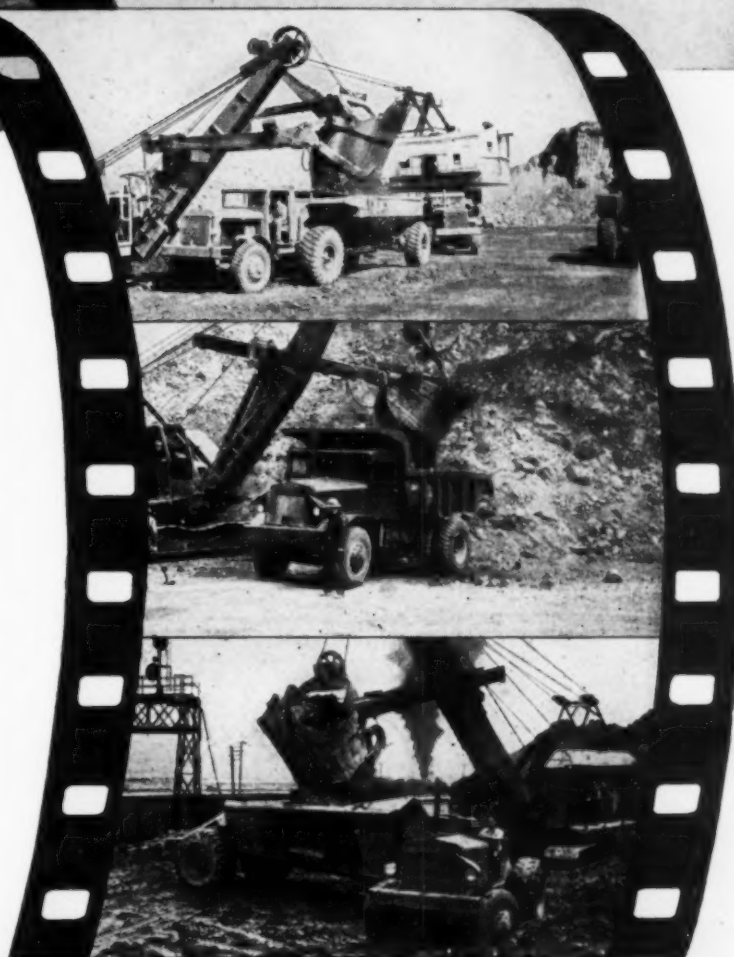


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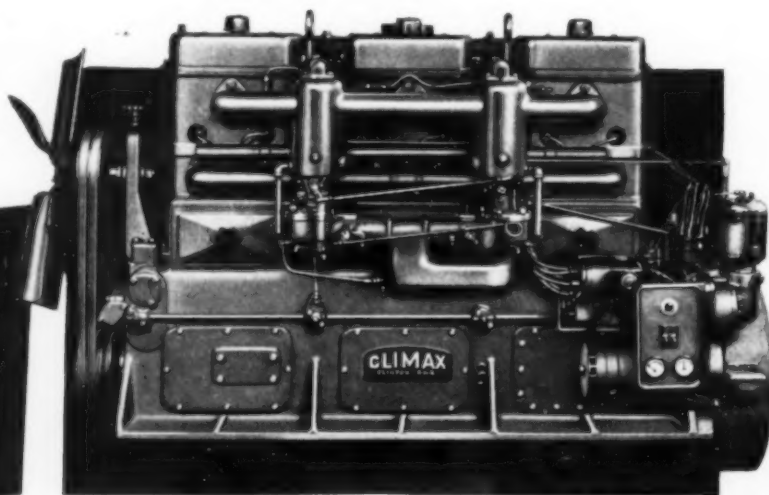
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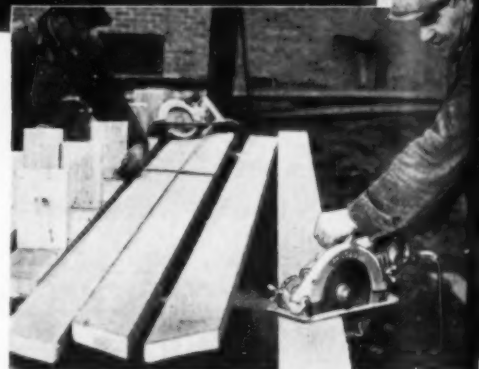
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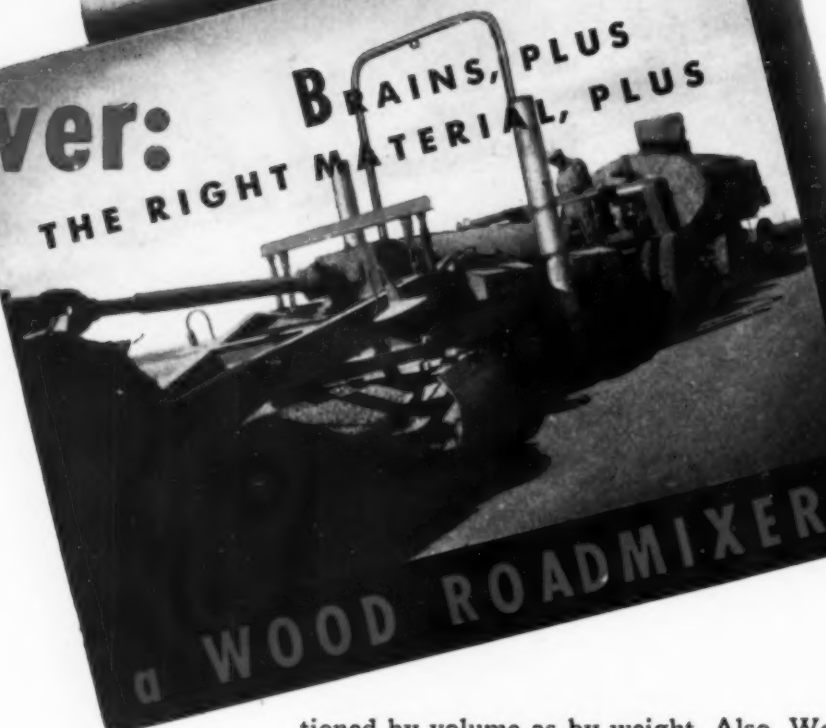
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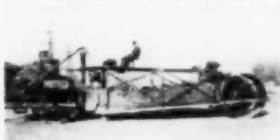
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- High Average Speeds—up to 14.3 m.p.h.
- Long Wheel Base—22 feet on Super C.
- Interchangeability—from Carryall to Crane, Wagon or Trailer widens use and profit possibilities.

Compare these money-making advantages with ordinary earthmoving tools.

- ☐ Should tires be larger?
- ☐ Cab, seat, batteries, etc., be improved?
- ☐ What capacity Carryall Scrapers for Tournapulls?
- ☐ What type of dump trailer—slide-off, bottom dump, side dump?
- ☐ What capacities?
- ☐ What other trailers or tools?
- ☐ Crane?
- ☐ Rooter?
- ☐ Dozer?

Then write us. And don't be afraid to throw in your gripes . . . LeTourneau wants your honest opinion. Make your suggestions and do your kicking today . . . and LeTourneau will guarantee you a postwar Tournapull you can make profits with on any haul, long or short. Write NOW.

LETOURNEAU

PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

TOURNAPULLS

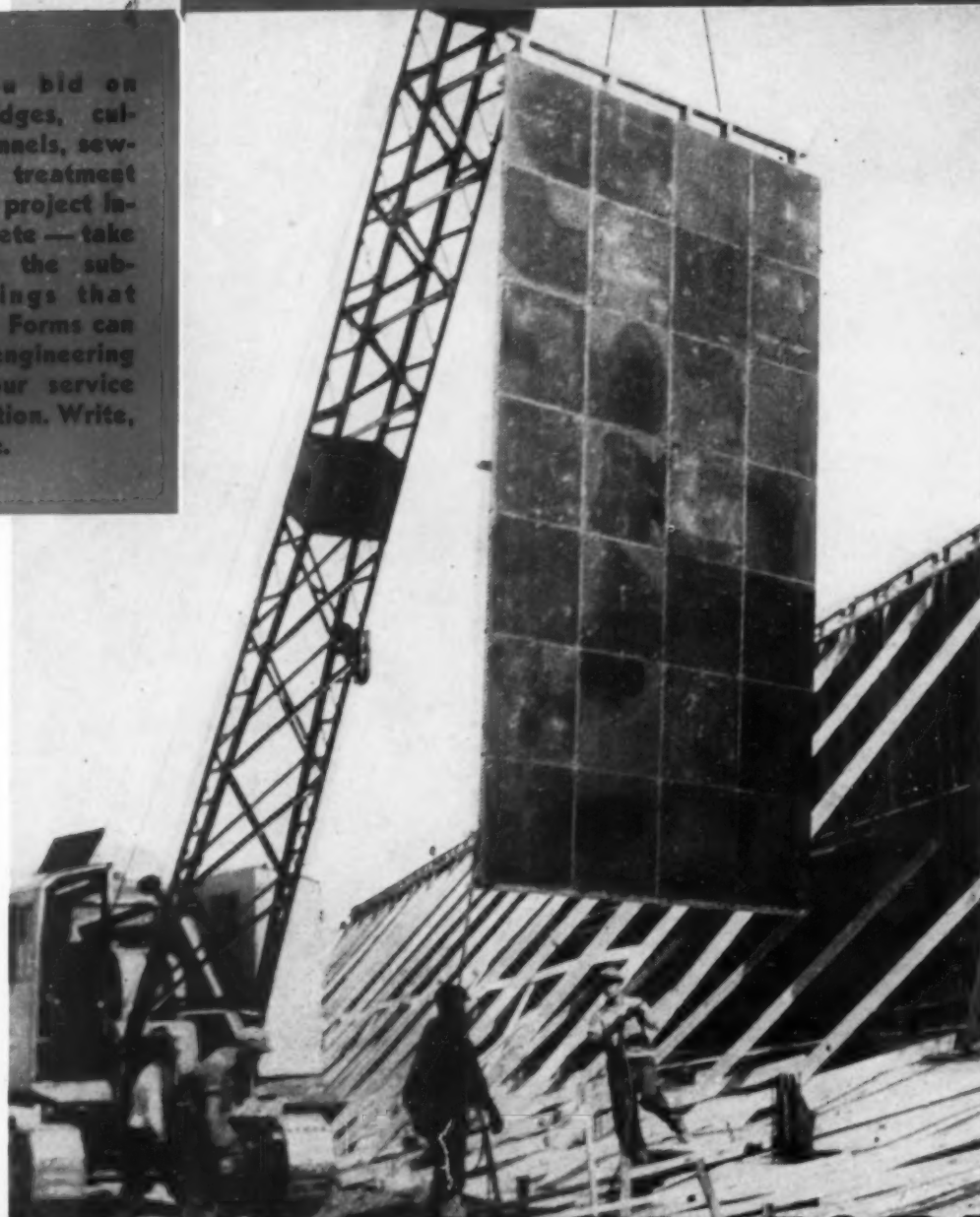
RUBBER-TIRED POWER FOR FASTER EARTHMOVING

Trade Mark Reg. U. S. Pat. Off.

FOR CONCRETE CONSTRUCTION

WHEN you bid on buildings, bridges, culverts, tanks, tunnels, sewage or water treatment plants, or any project involving concrete — take advantage of the substantial savings that Economy Steel Forms can make. Our engineering staff is at your service without obligation. Write, wire, or phone.

Placing concrete can often be expedited by moving Economy Forms in large groups or set-ups — one of the many vital Economy features.



ECONOMY STEEL FORMS

A nation-wide form-rental and engineering service that saves critical material and time in concrete construction. We welcome job inquiries by letter, wire or telephone

Des Moines, Iowa, Phone 4-3101 **ECONOMY FORMS CORP.** Fort Wayne, Ind., Harrison 2363



FOR *The* INDUSTRIAL DEMANDS *of* TOMORROW

PREFORMED

The toughest fighting job is still ahead.

Today every ounce of our energy is being devoted to war-winning activities and will continue to be until Victory is ours.

But . . . tomorrow will tell a different story . . . then we can *again* assume our job of supplying industry engaged in peace-time and constructive production.

And . . . for your Post War Planning — let the Red Strand be your guide in buying wire rope.

A. LESCHEN & SONS ROPE CO.

WIRE ROPE MAKERS

5909 KENNERLY AVENUE

NEW YORK " " 90 West Street
CHICAGO " " 810 W. Washington Blvd.
DENVER " " 1554 Wazee Street



ESTABLISHED 1857
ST. LOUIS, MISSOURI, U. S. A.

SAN FRANCISCO " " 520 Fourth Street
PORTLAND " " 914 N. W. 14th Avenue
SEATTLE " " 3410 First Avenue South



EVER BEEN UP IN ALASKA? ... or in Greenland? ... or Iceland?

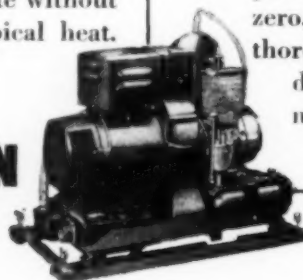
Thirty, forty, fifty degrees *below* zero. And the wind cuts through you like a knife.

Nevertheless, planes have to fly and men have to work... *and so does the equipment they use.*

Take, for example, the Homelite Portable Generators that are carried out on the snow-covered fields to charge batteries and test electrical equipment on planes... what would happen if they couldn't stand the weather and froze up every time they stuck their noses out in the open?

Well, they don't freeze up. They *can't* freeze. For they're air-cooled gasoline-engine-driven units, designed and built to operate without trouble in brutal sub-zero weather or in blistering tropical heat. They never let you down.

HOMELITE CORPORATION
PORT CHESTER, NEW YORK



How We Do It

Weather conditions of the frozen north are duplicated right in the Homelite plant. In a specially constructed room, where the temperature is kept far below zero, Homelite units undergo thorough performance tests under the same conditions that must be faced in the Arctic.

PICKS UP and LOADS *Salvaged Material* from HIGHWAY MAINTENANCE and CONSTRUCTION

War-Traffic, Shortages in Equipment and Manpower Have Played Havoc With Your Roads and Highways. The Athey Force-Feed Loader Can Help Solve Your Maintenance Problems.



TODAY's highway conditions are critical and prompt action is essential if tremendous investments in highways are to be saved before additional damage is done.

During 1944 a vast program of highway maintenance will get underway — roads will be graded, widened, straightened, — ditches will be cleaned and relocated — surfaces repaired — shoulders widened and slopes refaced and graded. The Athey Force-Feed Loader, a proved highway maintenance loading tool, will eliminate the former slow and costly method of loading surplus materials.

Helps You Do Better Job

Operating as a companion tool to the Motor Grader, it gathers up windrows of surplus material, removes it from the highway and loads it into trucks for disposal or salvage. Earth, sod, rock, sand, oil mix, and many other unruly materials are loaded at higher speed and in greater volume than ever before possible. To load this material by hand labor would be not only expensive, but practically impossible with today's manpower conditions.

The Athey Force-Feed Loader thus saves you time and expense in removing surplus road materials, and also, salvages materials for use where needed on other jobs.

Ditch Cleaning

Loading and handling excess materials thrown up and windrowed from ditches by the motor grader has long been a problem for engineers and maintenance men. Today, the Athey Force-Feed Loader not only makes this work quick and easy, but it saves so much of the maintenance crew's time that men are released for other road repairs.

One man operated, the Athey Force-Feed Loader can be moved quickly under its own power from job to job. Its simple and dependable operation affords faster, cleaner, lower cost loading than ever before.

Get complete information on an Athey Self-Propelled, Force-Feed Loader from your Athey-"Caterpillar" Dealer, or write direct to us. Athey Truss Wheel Co., 5631 W. 65th Street, Chicago 38, Illinois.



Reloading material salvaged from highway resurfacing job.

FREE ENTERPRISE • THE OPPORTUNITY AND OBLIGATION TO COMPETE



Athey Force-Feed Loader picking up windrow of oil mix material.

Athey

FORCE-FEED LOADERS



*"You should have seen
those little rats run!"*

On fighting fronts all over the world, word has come back of bulldozers in action, not only doing the vital jobs for which they are built, but *fighting* jobs as well. Among the most spectacular of these reports is the following contained in a letter from one of Buckeye's men in service:

"Now here is something I would like to tell you, now that I am back out of New Guinea. We had two pillboxes that were impossible for us to take, so they had a bulldozer about four miles away. We brought it up and by raising the blade charged the boxes. You should have seen those little rats run. We are still laughing. Now let me tell you something—it was a Buckeye blade and a Buckeye winch on the back! Keep up the good work and keep the Japs on the move."

After the war you can count on Cable Controlled Buckeyes to keep costs on the run. They've been proved in action — stripped down to fighting trim and built to take a beating. You'll be buying new equipment when it's available again. *Keep your eye on Buckeye!*

BUCKEYE TRACTION DITCHER CO.
Findlay, Ohio

Buckeye ✓

**WITH
BUCKEYE
CABLE CONTROL,
YOUR TRACTORS
CAN DO MORE
JOBS!**

Trenchers
Tractor Equipment
Road Wideners

Convertible Shovels
Spreaders
Power Finegraders



WINSLOW

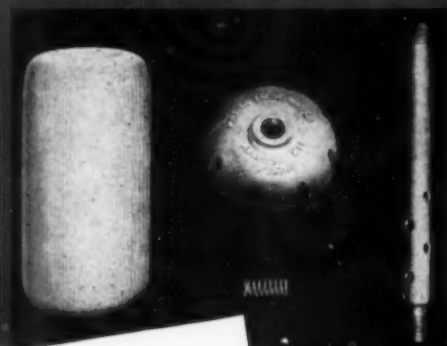
THE OIL FILTER THAT KEEPS MOTORS *clean*



• Dirty motors with gummed-up pistons, stuck rings and corroded bearings mean lost power, wasted fuel, excessive lay-ups and repair bills.

• WINSLOW FILTERS not only CLEAN oil . . . they CONDITION oil . . . giving it a "cleansing" action which results in improved engine performance.

THE *Engineered* OIL FILTER ELEMENT



A FEW WINSLOW USERS

Morrison-Knudsen
Company

•
Greyhound Lines

•
Oregon Shipbuilding
Corporation

•
Hall-Scott Motor Car
Company

•
Utah Construction
Company

Typical WINSLOW Conversion

NO. 849-C replaces
"Caterpillar" Model
849s No. 8-B-6000.

KIT C.D.-3 is used
on first installa-
tion only.

WINSLOW REPLACEMENT ELE-
MENTS are engineered to give
real performance in all types
of gasoline and diesel powered
motors . . . and they can be used
to replace old style felt, screen,
metal edge or other elements in
all-flow, in-line filters.

Due to the exclusive patented
principle on which WINSLOW
Replacement Elements are made,
they EXPAND with use, thereby
retaining maximum porosity and
greater efficiency over a longer
period of time without clogging.

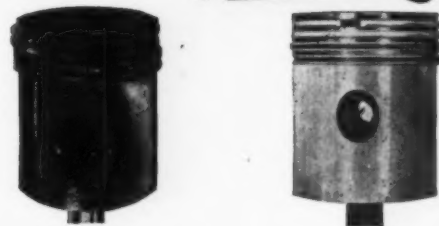
The WINSLOW filters out all harmful substances
without affecting lubricating compounds or oil
additives used in modern compounded oils.
Winslow Elements neutralize acid and tend to
prevent corrosion.

JOBBERS are invited to investigate the Winslow
agency proposition.



- Save Oil!
- Reduce
Repair Bills!
- Use Winslow!

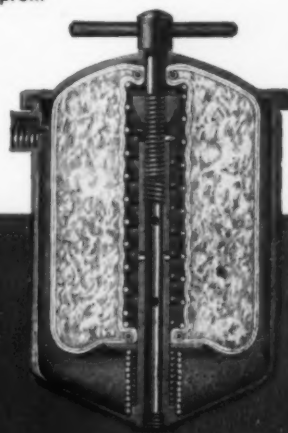
HERE'S *proof*



Above are UN-retouched photographs of the same piston.
The dirty gummed-up view at left shows how the piston
looked when it was removed from a motor equipped with
an old style, conventional filter element.

The view at right shows the condition of the same piston
after a WINSLOW replacement element had been installed,
and the car had been used approxi-
mately 250 hours longer.

Note that carbon, sludge var-
nish, resin and other foreign
substances have been re-
moved . . . AND THE RINGS
ARE FREE!

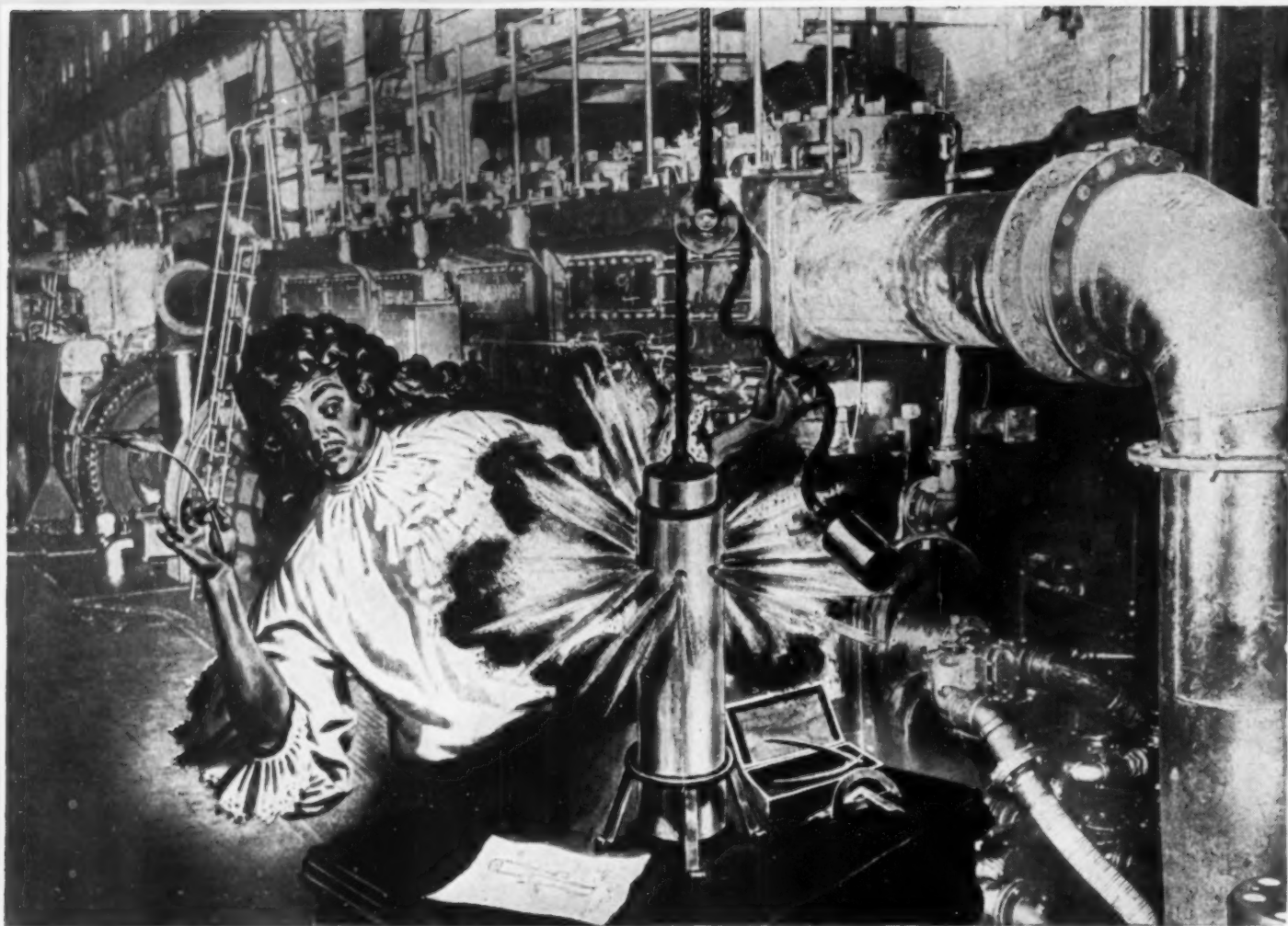


Note the great difference in
construction of the Winslow
Free-Flow Element, exposing a
maximum area to incoming
dirty oil and maximum capacity
for the collection of foreign
substances that cause excessive
motor wear and reduced effi-
ciency.

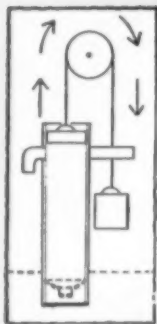
WINSLOW SALES CO.

20 Montgomery St. • San Francisco, California

Product of WINSLOW ENGINEERING COMPANY, Oakland, California



FAIRBANKS-MORSE, big name in Diesels—descendants of Huygens' internal combustion engine of 1680—builds 52 models and sizes for the Armed Forces and the home front. Shell supplies both Diesel oil and Diesel fuel.



POP goes the Diesel

Christian Huygens, "connecting link between Galileo and Newton," built an engine embodying a cylinder, piston, valves. For fuel he used gunpowder . . .

Although structural defects caused the abandonment of this design—and nearly put an end to Huygens—it's the granddaddy of all combustion engines, most efficient of which is the modern Diesel.

Fairbanks-Morse makes more types of Diesels than any other firm in America. These supply motive power in submarines and PC's for the Navy; in tugs, cargo vessels, tankers for the Maritime Commission and Army. On the home front they're used in industrial and municipal power plants, locomotives and Marine service—for many another use.

Power for the vast Fairbanks-Morse plant is furnished from Diesels on test and in the powerhouse. For these engines Shell Dieseline is used as fuel—a Shell Diesel Oil as the lubricant.

Shell Diesel Oil was chosen because of its remarkable performance in keeping Diesels clean, and because Fairbanks-Morse engineers were confident there would be no trouble in test runs due to faulty lubrication.

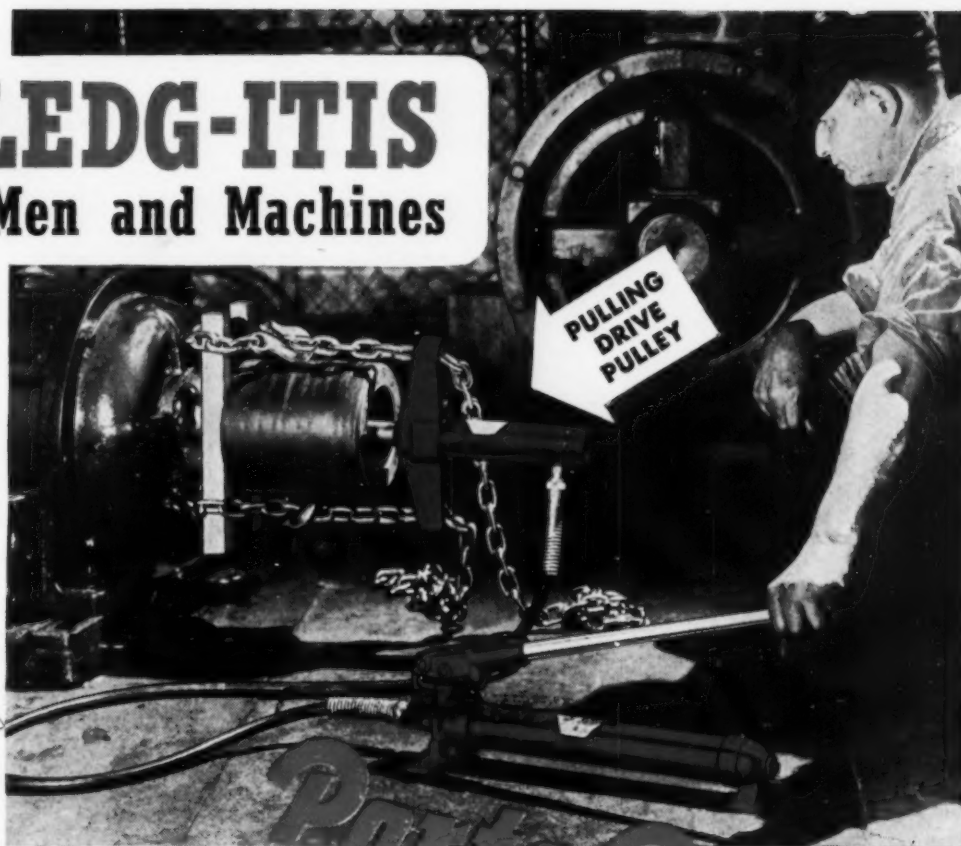
In tractors, trucks, buses, ships, in all types of Diesels on land and sea, you'll find this same confidence expressed by those who use Shell Diesel Lubricants . . . a confidence founded on the sterling performance of Shell Diesel Lubricants under all sorts of operating conditions.

Know what really dependable Diesel lubrication is—call in the Shell man now.



SHELL DIESEL LUBRICANTS

Don't let **SLEDG-ITIS**
endanger your Men and Machines



Porto-Power

Beat Hercules At His Own Game With

SUPPOSE you had tons of power in your fingers—to pull, push, spread, pinch, lift, clamp and bend! *What miracles you could accomplish in maintenance work and manufacturing!*

Actually Porto-Power enables you to apply tons of hydraulic power as flexibly as you use your fingers—and with absolute safety!

Pulling gears and wheels, straightening shafts, bending pipe, separating heavy dies, pressing tight-fitting assemblies or keys into place—these are only a few of the 1001 uses for Porto-Power in industry.

Porto-Power saves time and machines—makes tough jobs easier and safer for men—replaces damaging and dangerous sledging, heating and prying. It is fast becoming standard hydraulic service equipment in production plants, shipyards, construction companies, repair and maintenance organizations.

Write Blackhawk or call your industrial supply distributor for complete information on Porto-Power in 7, 10, 20 and 50-ton capacities.

A Product of

BLACKHAWK MFG. COMPANY

Department 2334

Milwaukee 1, Wisconsin



BLACKHAWK
Hydraulic Equipment—Wrenches



BLACKHAWK MFG. COMPANY
Dept. P2334, Milwaukee 1, Wis.

Send catalog on Porto-Power and complete wartime Hydraulic Equipment line.

Name _____

Firm _____

Address _____

The steel backbone of concrete *in Rockefeller Center*

IN ROCKEFELLER CENTER, New York, as well as in many of the country's foremost buildings, millions of square feet of American Welded Wire Fabric have made concrete floors, roofs, and walls safe, long-lasting and fireproof. Wire fabric provides a backbone of steel that weaves strength into the concrete slab in every direction.

This product, manufactured from high-yield-point cold-drawn steel, is convenient to handle, is installed quickly and easily, lies flat, and always stays in place. Where wire fabric is used, construction time is cut, costs are reduced, and a permanent structure is the result.

We will be glad to send you additional information explaining why wire fabric is the ideal reinforcement for concrete work.



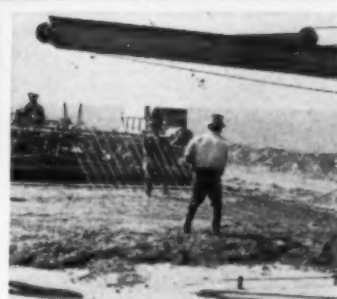
Highways—Added years of useful life are built into highways which are reinforced with cold-drawn welded wire fabric.



Buildings—The cost of installing wire fabric is low—construction time is reduced. Here it is being used for reinforcing concrete floors.



Concrete Pipe—Engineers make long life and economy doubly certain by specifying wire fabric for reinforcing concrete pipe.



Airports—Runways, ramps, roadways and aprons will last longer and require less maintenance when reinforced with wire fabric.

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York



Columbia Steel Company, San Francisco, Pacific Coast Distributors
United States Steel Export Company, New York

**AMERICAN
WELDED
WIRE FABRIC**

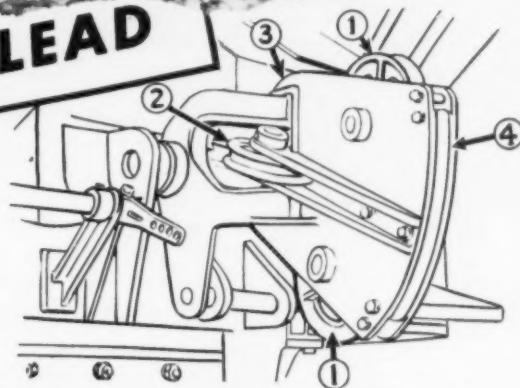
UNITED STATES STEEL

P & H

MAKE WAR ON WEAR
WITH PROPER CARE...

**MAKE
CABLES
LAST LONGER
... CHECK YOUR FAIRLEAD**

Smooth-running sheaves, smooth face plates, smooth swiveling action—these are the important things to watch in maintaining your fairlead to prevent fraying and undue wear of cable. Neglect them, and you pay the cost in frequent cable replacement. A good cable will deliver all the service you pay for—and more—if you prevent pinching, wedging, rubbing and flexing caused by wobbly sheaves, "sticky" pins, or "sandpaper" surfaces. Join the war on wear by checking your fairlead sheaves, bushings, pins and wearing plates today. Other maintenance is reduced to a minimum with P&H all-welded construction, tractor type crawlers, smooth hydraulic control and many other long life advantages.



Adjust and lubricate the vertical and horizontal sheaves (1 and 2); tighten or replace loose pins or bushings (3); check alignment and lubricate. Check face plates for rough spots that cause fraying (4). Write for Wartime Service Bulletin D-65, "Fairlead Maintenance."

General Offices:

4494 W. National Ave., Milwaukee 14, Wisconsin

HARNISCHFEGER
CORPORATION
EQUIPMENT - ELECTRIC CRANES - ARC WELDERS - MOTORS - WELDING ELECTRODES - MOTORS

WARTIME PROBLEMS of New Sand and Gravel Plant SOLVED BY...

TELSMITH



- 1 TelSmith Super Scrubber
- 2 Two TelSmith Sand Classifiers
- 3 TelSmith Sand Drag
- 4 TelSmith Gyrasphere Secondary Crusher

G-11



● Hempt Brothers, Harrisburg, Pa., are quarry and gravel plant operators. War work demands for concrete necessitated building a new plant on a large deposit near Elizabethtown, Pa. Quantity processing of the crumbly quartzose conglomerate requires generous crushing, screening, classifying capacity. Yet co-operation with the war effort meant holding the use of new machinery and critical materials to a minimum.

One of those tough, it-can't-be-done problems. But TelSmith Engineers came through with the right answer and the right equipment. The result is a balanced, flexible, smooth-working plant turning out 75-100 tons per hr. washed silica sand.

From a scalping screen following the primary breaker, plus $\frac{3}{4}$ " material goes to a No. 36 TelSmith Gyrasphere Secondary Crusher in closed circuit with the scalper. Minus $\frac{3}{4}$ " goes to a 4' x 10' TelSmith double deck Pulsator Screen over a 35-ton steel bin. One size of crushed gravel is stored in bin; and plus $\frac{3}{16}$ " pebbles are chuted to a 40" x 22" TelSmith high speed, roller bearing Double Roll Crusher with adjustable flow belt feeder. This crusher is also in closed circuit. Minus $\frac{3}{16}$ " sand size goes through a 72" x 10 $\frac{1}{2}$ " TelSmith Super Scrubber and then to two large-bowl, 3-side overflow, twin-screw TelSmith Sand Classifiers making concrete sand which goes to a 200-ton steel bin or to ground storage. Classifier overflow is flumed to a 60" x 30' TelSmith Sand Drag which produces plaster sand. For details on TelSmith equipment get Bulletin G-10.



SMITH ENGINEERING WORKS, 510 E. CAPITOL DRIVE, MILWAUKEE 12, WISCONSIN

Cable Addresses: Sengworks, Milwaukee—Concrete, London
 Room 1604—50 East 42nd St. 211 W. Wacker Drive 713 Commercial Trust Bldg. 19-21 Charles St. G. F. Seeley & Co. Mines Eng. & Eqpt. Co.
 New York 17, N.Y. Chicago 6, Ill. Philadelphia 2, Pa. Cambridge 41, Mass. Toronto, Ont. San Francisco 4—Los Angeles 14
 Brandeis M. & S. Co. Charleston Tractor & Eqpt. Corp. Roanoke Trac. & Eqpt. Co. North Carolina Eqpt. Co. Wilson-Weesner-Wilkinson Co.
 Louisville 8, Ky. Charleston 22, W. Va. Roanoke 7, Va. Raleigh & Charlotte, N. C. Knoxville 8 and Nashville 6, Tenn.



TURNING the desert into agricultural paydirt is the job of the U. S. Bureau of Reclamation.

Cutting through the hill, and lining the ditch is the work of equipment powered by Diesel and heavy-duty gasoline engines.

To keep their internal combustion powered equipment on the job and operating efficiently, contractors everywhere are using *Texaco Ursa Oil X★★*.

Texaco Ursa Oil X★★ is both detergent and dispersive. Its detergency keeps piston rings free and engine parts clean. Its dispersive ability holds deposit-forming materials in suspension until drained at

oil-change. *Ursa Oil X★★* protects alloy bearings and prevents scuffing of rings, pistons, cylinders.

For quieter-running, longer-lasting transmission and differential gears, use *Texaco Gear Lubricants*.

So effective have Texaco lubricants proved that they are definitely preferred in many fields, a few of which are listed on the right.

Texaco Lubrication Engineering Service is available to you through more than 2300 Texaco distributing points in the 48 States.

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

THEY PREFER TEXACO

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

• More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

• More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.



TEXACO Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

TUNE IN FRED ALLEN EVERY SUNDAY NIGHT—CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

Keep Your Horses Pulling on the Victory Road

You'll get the most efficient excavator performance when all the "horses" in your engine are pulling full strength. Here are a few hints that may help keep that engine humming.

- 1 ★ Inspect engine regularly and keep it clean. 
- 2 ★ Warm a cold engine up slowly (don't use choke more than is absolutely necessary).
- 3 ★ Don't stop a heavily loaded engine abruptly. Let it idle a little to cool off before shutting down.
- 4 ★ Flush radiator out whenever water gets dirty. Be sure water added is clean. Never add cold water to an overheated engine. 
- 5 ★ Use good grade lubricating oil. (Follow manufacturer's recommendations). Clean sump and change filter element frequently (every other oil change is good practice).
- 6 ★ Keep proper amount of water in battery. (Add water when starting, never when shutting down). Keep terminals covered with grease to avoid corrosion.
- 7 ★ In gasoline engine, keep spark plugs and distributor points properly adjusted and clean.
- 8 ★ In diesel engine, check injection nozzle pressures after 300 hours on a new engine, every 1500 hours thereafter. **KEEP FUEL CLEAN.** Storage tank and transfer containers or pumps should be kept free of both dirt and water.
- 9 ★ Get complete care and maintenance instructions from manufacturer or distributor, and follow them carefully. 

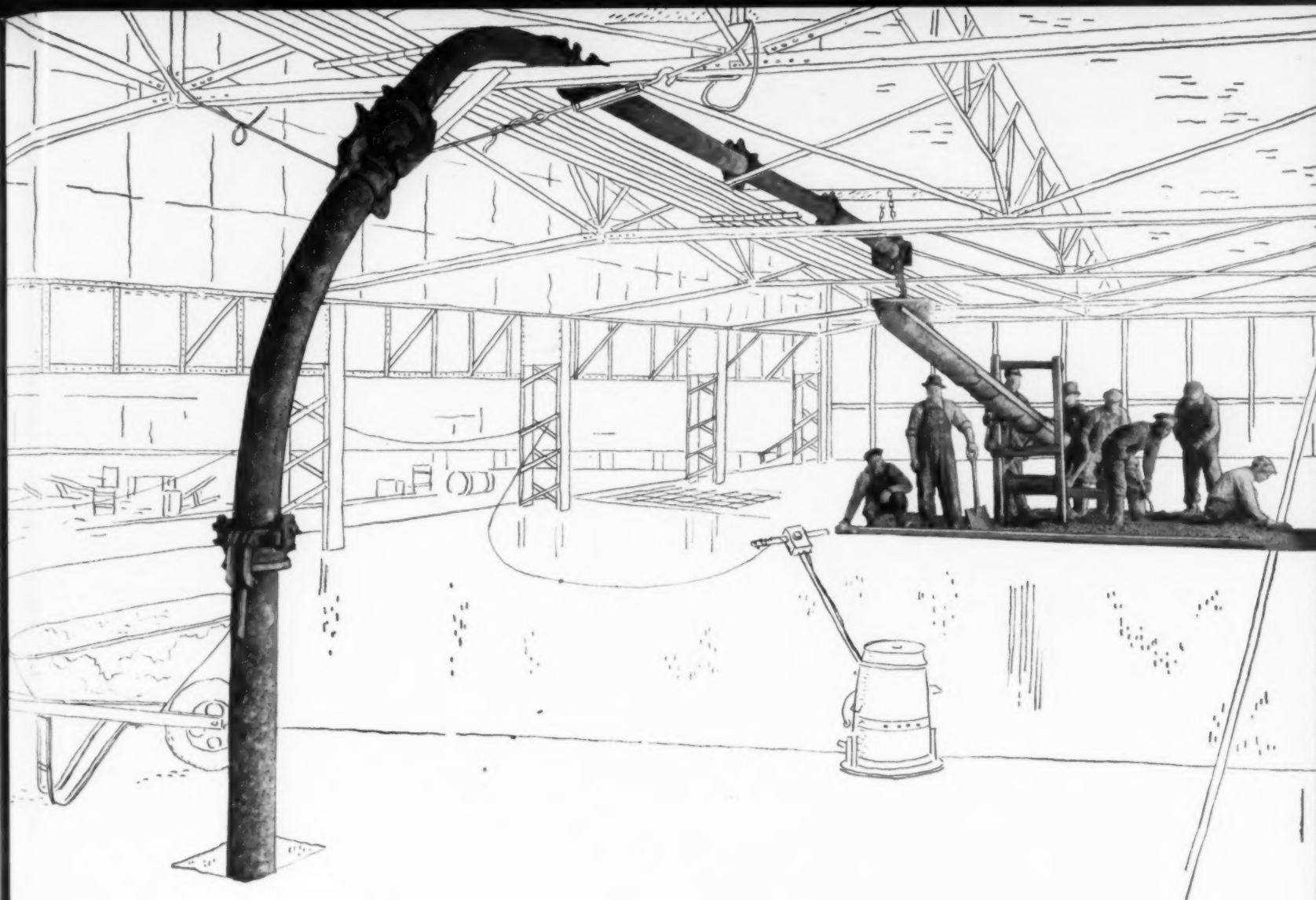




Bucyrus-Erie employees have accepted the award of the Army-Navy "E" as a challenge to keep production rising. * *

Bucyrus-Erie

S O U T H M I L W A U K E E • W I S C O N S I N • U . S . A .



Like Putting the **YOLK IN AN EGG...**

It was just like putting the yolk in an egg, this job of putting a new concrete floor in the second floor testing room of this busy war plant. It had to be done without disturbing the workers in the rest of the plant and impeding production. Concrete could not be run down from the roof or hauled up from the ground in an old-fashioned manner without interfering with somebody—for this room was truly in the middle of the plant.

Actually, the solution was easy . . . Rex Pumpcrete. No chutes, no hoists, no towers, no buggy runs . . . just a pipe line. The pipe line was run from the Pumpcrete through one of the first floor windows, up through the ceiling and along the second floor to the testing room. The Pumpcrete pumped concrete through

the pipe line in a fraction of the time it would have taken with old-fashioned methods.

To simplify your difficult concrete placing jobs . . . to speed up placing time . . . check Rex Pumpcrete. It pumps concrete vertically as high as 120 feet or horizontally as far as 1200 feet.

For complete information on Rex Pumpcretes, send for descriptive bulletins. And check the other Rex construction equipment: Moto-Mixers, to speed the mixing, hauling and placing of concrete . . . Pumps, that move water economically and efficiently . . . Mixers, that cut concrete mixing costs . . . Pavers, that can give you really heavy yardage production, faster. See your Rex Distributor or write direct to Chain Belt Company, 1664 West Bruce Street, Milwaukee 4, Wisconsin.

CHAIN BELT COMPANY of Milwaukee



CONSTRUCTION MACHINERY



MOTO MIXER



PAVER



PUMPCRETE



MOTO MIXER



MIXER

Prepare for

WITH AUSTIN-WESTERN

CRUSHING PLANTS



TWIN-UNIT PLANT

This Plant combines maximum output with the flexibility and portability that result from building it in two Units, which, along with the conveyors that serve them, can be set at any desired angle with respect to each other.

A typical Primary Unit, for gravel, will have a 1036 jaw crusher; for quarry operation, the crusher would be a 2540. Material can be by-passed around the Secondary Unit directly to the bin. Sand can be removed at either the Primary or Secondary Unit. The Secondary Unit can be designed to produce all the way from one size to four sizes of material.

On an airport construction job, requiring both $1\frac{1}{4}$ " minus and $2\frac{1}{2}$ " minus, the Twin-Unit Plant at the left averaged 500 tons per hour for the entire job, crushing 25%. Such production records explain why more and more operators are building their plans for wider and more profitable operations around the Austin-Western Twin-Unit Plant.

C.E.P. CRUSHING PLANTS

C.E.P. (Crusher, Elevator, Power) Plants can be had with any size Austin-Western crusher; can be used alone, or incorporated into more elaborate Plants. The folding-type, bucket elevator delivers the crushed stone to a loading bin. The power unit is mounted on the same trucks as the crusher. Most sizes of trucks can be fitted with pneumatic tires.

The Austin-Western line includes various styles and sizes of belt conveyors, screens and bottom-discharge bins; all of which can be combined with crushers to produce practically any desired size and style of portable, semi-portable or stationary Crushing and Screening Plant.



Post-War Profits

WITH AUSTIN-WESTERN

JAW and ROLL CRUSHERS

JAW CRUSHERS

Primary Crushers, or "Breakers," like the 2540 model shown at the right, are called upon to do the preliminary breaking of large stone down to a size that can be handled by the balance of the equipment.

General Purpose Crushers are made in several sizes, and can be used in either quarries or gravel pits.

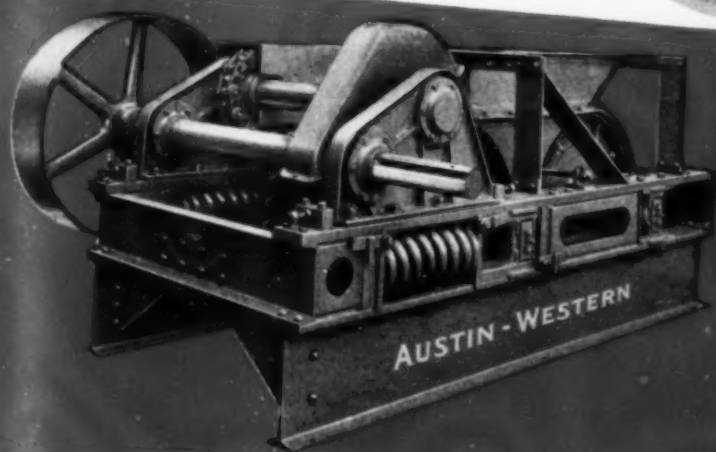
Austin-Western crushers have all the design and construction features that result from nearly 50 years of building equipment for handling gravel and stone—features that are responsible for enviable capacity and economy records.



ROLL CRUSHERS

This type of crusher is designed to take the stone after it has had its preliminary breaking, and reduce it to the smaller sizes of aggregate now so generally required.

Austin-Western Roll Crushers have many unusual and worthwhile features of design, including: SKF roller bearings, located inside the rolls; manganese steel shells; roller chain drive for the rolls, and counter-shaft for direct motor drive.



THE AUSTIN-WESTERN

ROAD MACHINERY CO.

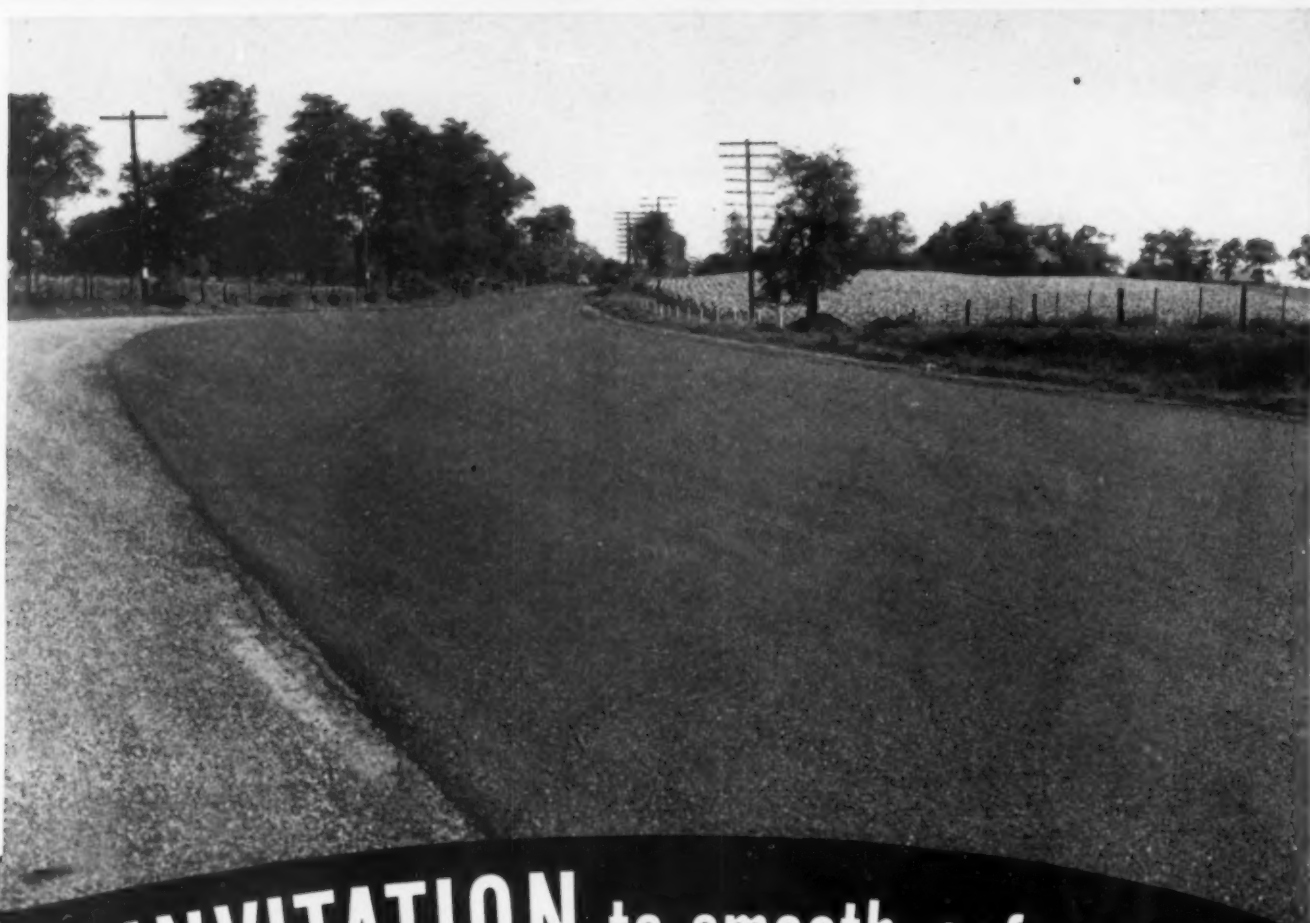
Austin Western

AURORA,

ILLINOIS, U. S. A.

BUY MORE
WAR BONDS

The Austin-Western line includes POWER GRADERS, ROAD GRADERS, ELEVATING GRADERS, ROAD ROLLERS, SHOVELS AND CRANES, STREET SWEEPERS, DUMP CARS, TRAIL CARS AND A COMPLETE LINE OF ROCK CRUSHING AND SCREENING PLANTS.



AN INVITATION to smooth, safe driving

Smooth driving, with maximum safety, are qualities which are written all over this 13-mile Texaco Asphalt section of U. S. 25 in Kentucky.

Add to those advantages the important characteristics of resilience and durability, and it is easy to understand why Texaco offers an ideal surface for your post-war road program.

A medium-curing Texaco Cutback Asphalt and stone were plant-mixed to provide the economical type of construction employed on U. S. 25.

For practical, helpful assistance in planning your post-war road program, take advantage of the service of a Texaco Engineer, who is an Asphalt specialist.

This resilient, skid-resistant Texaco Asphalt surface was laid last year on 13 miles of U. S. 25, south of Lexington, Ky.



THE TEXAS COMPANY, Asphalt Sales Dept., 135 E. 42nd St., New York City
Philadelphia Richmond Boston Chicago Jacksonville Houston

TEXACO ASPHALT

**GIVE YOUR
CONCRETE**

**A
BREAK**

USE



Cushioned-Air
Paving Breakers
at work. CC-80
left; CC-60 right.

Cushioned Air **PAVING BREAKERS**

**"Cushioned-Air" permits use of Greater Power and Results in
... Lower Upkeep Costs ... Easier Holding ... More Work Done**

You have "Cushioned-Air" in the Ingersoll-Rand CC-60 (60 pounds) and CC-80 (80 pounds) Paving Breakers. It prevents the piston from hitting the fronthead...there is less shock...more power is packed into the breaker...upkeep costs are lower. Moreover, because of the "Cushioned-Air" principle, tiring jolts are not transmitted through the machine to the operator's hands and arms.

Easier holding results, especially at higher air pressures, and more work is done.

No wonder "Cushioned-Air" Paving Breakers are standard equipment with so many contractors, utilities, and maintenance crews. Be sure that your next paving breakers are "Cushioned-Air." Ask the Ingersoll-Rand Service Division nearest you for complete details.

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y.

5-393

COMPRESSORS • TURBO BLOWERS • ROCK DRILLS • AIR TOOLS • OIL AND GAS ENGINES • CONDENSERS • CENTRIFUGAL PUMPS

War Inspired

KNOW YOUR NEAREST BLAW-KNOX DISTRIBUTOR

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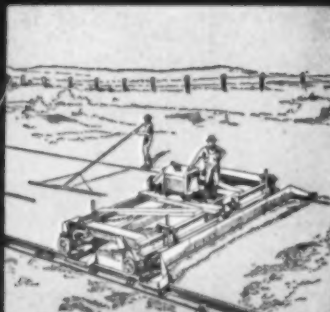


Blaw-Knox Construction Equipment is in use by our armed forces all over the world — where the going is toughest — on the construction of air bases and access roads. ¶ The war is teaching old dogs new tricks — and new points of design and construction, war inspired, will be found in the Blaw-Knox Construction Equipment you will be using for post war construction. ¶ Blaw-Knox Construction Equipment has been improved to provide greater production, lower cost of operation and higher quality of work.

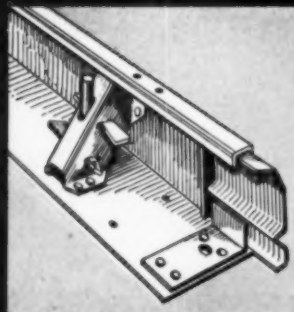
BACK THE ATTACK WITH WAR BONDS AND STAMPS



PAVING SPREADERS FOR
AIRPORTS AND ROADS



FINISHING MACHINES FOR
AIRPORTS AND ROADS



PAVING FORMS FOR
AIRPORTS AND ROADS

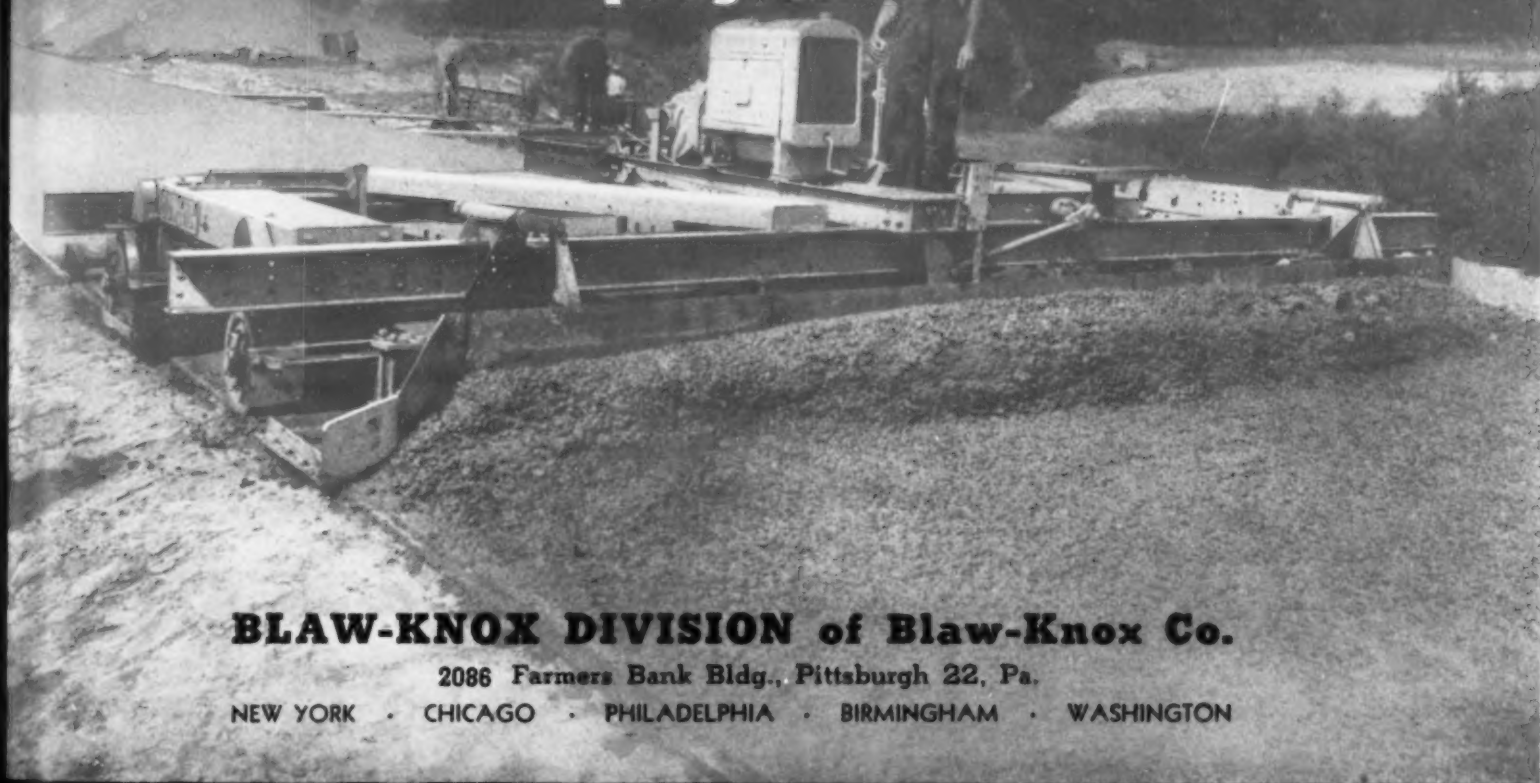


BULK CEMENT
PLANTS

Improvements.. *- now in action*

will be found in the **NEW**
BLAW-KNOX
Construction Equipment

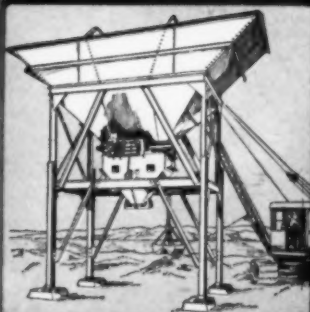
You will be using for the
post war road and airport
program



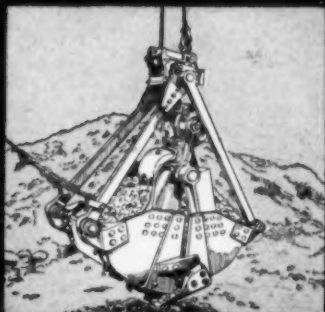
BLAW-KNOX DIVISION of Blaw-Knox Co.

2086 Farmers Bank Bldg., Pittsburgh 22, Pa.

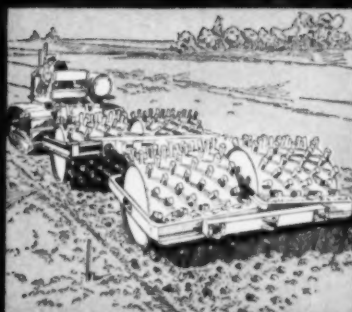
NEW YORK • CHICAGO • PHILADELPHIA • BIRMINGHAM • WASHINGTON



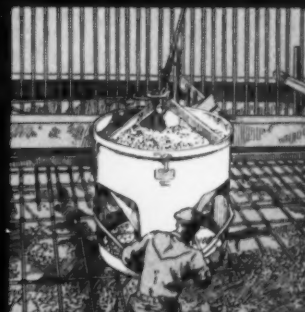
AGGREGATE BATCHING
PLANTS



CLAMSHELL
BUCKETS



SHEEPSFOOT
TAMPING ROLLERS



CONCRETE
BUCKETS



Said One Government Contractor . .
**"THAT PHOTO SHOULD HAVE
 A \$10,000 GOLD FRAME!"**

A sudden rain on a 4 inch gravel-emulsion base course at a military airfield, raised the moisture excessively. This occurred before compaction could be started, and therefore drying was essential before rolling could proceed.

To dry the material by any of the usual methods would have cost at least \$10,000.00 in man-power and equipment. And just as important was the element of time.

The answer was a wire to Seaman Motors. That night a SEAMAN MIXER was on its way. The next day the SEAMAN was on the job.

Up and down the runways the SEAMAN stormed along. With its hood raised, the spinning tines gathered the wet aggregate and threw the material in a long arc behind the machine. This aeration proved to be the answer, for, — in the first pass alone, excess moisture had been reduced 50%. A second pass made the aggregate acceptable.

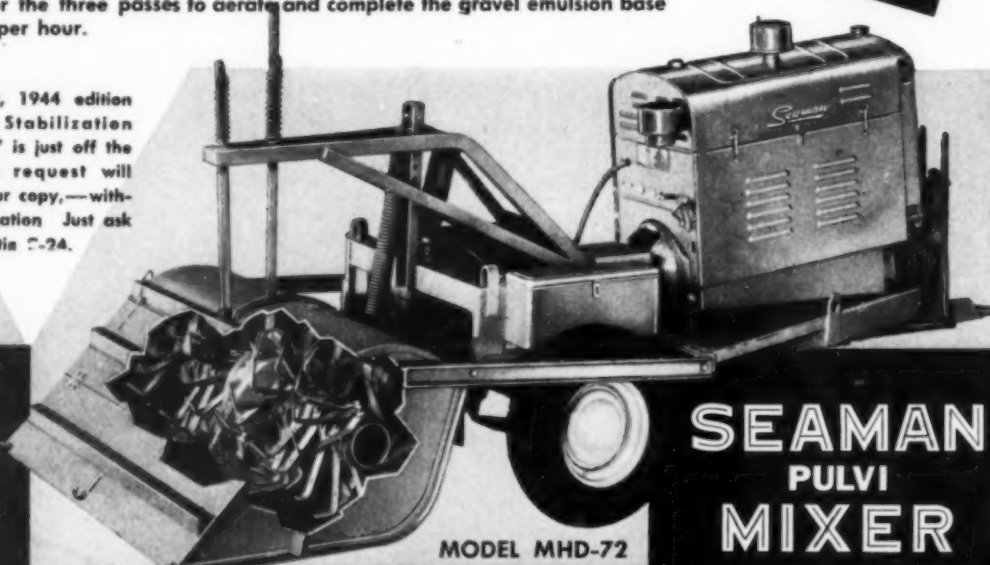
In the next operation, the hood was lowered and the coarse and fines re-mixed in-place, — ready for compaction.

The average total production for the three passes to aerate and complete the gravel emulsion base course was 1800 square yards per hour.



The new, 1944 edition of "Soil Stabilization Methods" is just off the press. A request will bring your copy, — without obligation. Just ask for Bulletin C-2A.

**SEAMAN
 MOTORS**
 MILWAUKEE
 WISCONSIN



MODEL MHD-72

**SEAMAN
 PULVI
 MIXER**

Why the C-1 cargo ship doesn't need a convoy

C-1 is a plain name for a beautiful cargo vessel. Displacing 12,900 tons, it is capable of 40% greater speed than the EC-2 (Liberty). Its service record includes many instances of sailing without convoy, of evading and outrunning enemy submarines.

Construction of the C-1 necessarily calls for workmanship of a high order, an example of which—fitting drive shaft to propeller—is shown here.

Upright is the stern section of the shaft. When coupled with additional sections and installed in the ship, it measures double the length of a regulation bowling alley, weighs 52 tons and is dimensionally accurate to within 2/1000 of an inch.

This tolerance, however, isn't allowable in the joining of shaft and propeller. Several hours of meticulous fitting, scraping and refitting are required before the result is achieved—a solid "no tolerance" juncture able to withstand the strain and speed of turbine power.

Efficiency in the production of the C-1, of naval craft and ordnance, of other war products has won for the men and women of Consolidated Steel Corporation every basic government industrial award. We intend to keep up the good work. And when victory is won, this organization of skills and crafts will again help to build in steel the great plans of a peacetime America.

Consolidated Steel

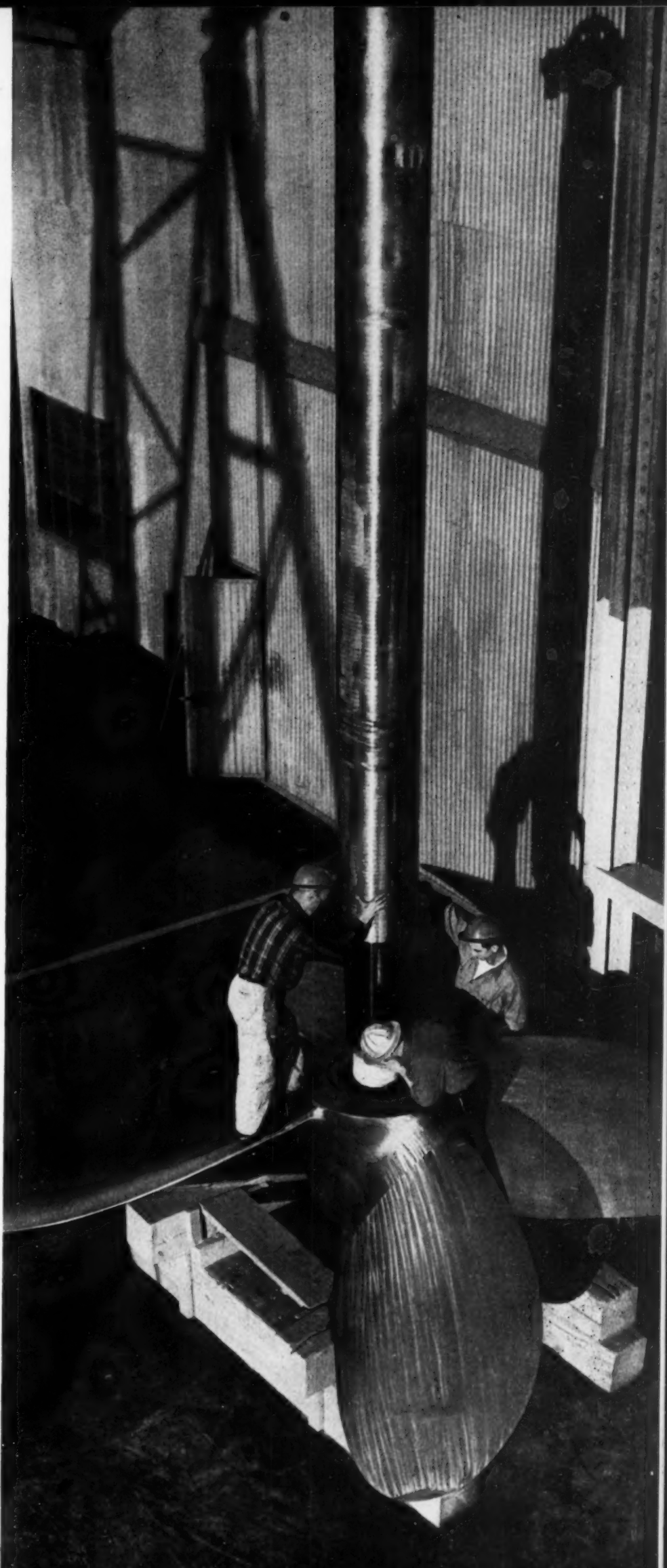


FABRICATORS
ENGINEERS
CRAFTSMEN

LARGEST INDEPENDENT IN THE WEST



CONSOLIDATED STEEL CORPORATION, LTD., LOS ANGELES,
LONG BEACH, WILMINGTON, CALIFORNIA; ORANGE, TEXAS





BRIXMENT—the Leading Masonry Cement

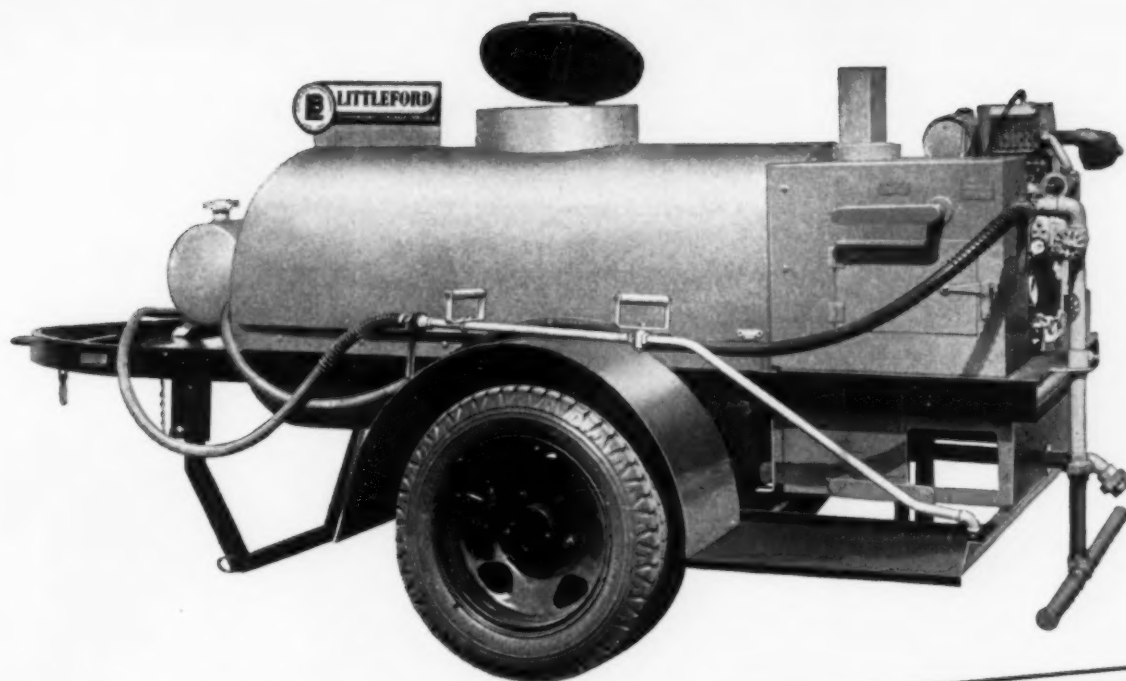
● For twenty-five years, Brixment has been recognized as the *best* masonry cement on the market. Government statistics show that it is by far the largest-selling and most widely-used brand. It is universally considered the standard for all masonry cements.

During recent years, of course, a number of somewhat similar products have been brought out in an attempt to compete with Brixment. But none of them can use the same raw materials and the exclusive Brixment process. Therefore, no other masonry cement combines to such a high degree the same plasticity, strength, bond, water retention, and freedom from efflorescence. It is this *combination* of advantages that makes Brixment superior to other masonry cements, and *especially* to any mixture of portland cement and lime.



Red stars indicate the two mills at which Brixment is made—the black dots indicate the mills of other cement companies which stock Brixment for shipment in mixed cars with their own portland cements.

LOUISVILLE CEMENT COMPANY, Incorporated
General Offices: Louisville 2, Kentucky
Cement Manufacturers Since 1830



MODEL No. 101 UTILITY SPRAY TANK

Here's a Unit that will cut post war Black Top Construction and Maintenance costs to a minimum. Designed by Littleford to do three jobs instead of one. Model No. 101 will handle tar, asphalt, cutback,

and emulsion. Model No. 101 is heated by Littleford Model No. 101 Utility Spray Tank;

When planning for the future, include a Littleford Model No. 101 Utility Spray Tank; why purchase three units when the No. 101 will do the work.



1 Model No. 101 can be used as a Distributor, has Spray Bar for small application jobs.



2 For crack filling. Model No. 101 has pouring pot outlet.



3 Spraying patches with the Hand Spray is the popular use for the Model No. 101.



LITTLEFORD

LITTLEFORD BROS., Inc.
465 E. Pearl St., Cincinnati, Ohio



Meet the dragon wagon

A typical example of B. F. Goodrich development in rubber

"**D**RAGON WAGON" is what the soldiers call this tank recovery unit. It is a mammoth truck trailer powered by an army-designed tractor, big enough to carry a 30-ton General Sherman tank on its back.


On the battlefield, the dragon wagon is used to haul away disabled tanks, carry them behind the lines to a repair depot.

Tires for such front-line service presented an unusual problem. They had to be able to carry tremendous loads, to travel over rocks and desert

sand, to wade through mud and water — and to keep on going when hit by machine gun bullets!

For many army jobs regular B. F. Goodrich truck tires did the trick. For combat service special tires were developed of extra-thick rubber. These tires are built in such a way that when hit by a bullet the extra-thick sidewalls can support the load. And the tires are locked to the rim so that even when flat, the tire hangs on to the wheel. The vehicle can still travel.

It's because of these military needs

that tires for civilians are scarce, but some are being made. Those for passenger cars are all-synthetic (99.8%) and are almost as good as pre-war tires. Truck tires aren't yet as good, especially in intercity service with overloads, but are being improved day by day. If you *can* buy tires, go to a B. F. Goodrich dealer or store. You'll get synthetic tires backed by 17 years of experience with synthetic rubber in all kinds of products. *The B. F. Goodrich Co., Akron, O.* 

B.F. Goodrich
Truck & Bus Tires



**YOUR PEACETIME
AGGREGATE PLANT
is being tested in
New Guinea!**

Cedarapids

**Built by
IOWA**

YOU can't build "too good" for war! But there have been manufacturers who have thought there was a limit to quality requirements for peacetime service. That hasn't been the slant that Iowa Engineers have taken on the development of Cedarapids equipment, and, if it was not for the terrible phases of the picture, we would welcome the opportunity the war presents to test and learn about Iowa performance under war-time's terrific stress for the improvement of peacetime equipment.

Cedarapids equipment has met and is satisfying the problems of war. A plant a day rolls out of the great Iowa assembly bay to some battlefield. The enormous wartime effort, *unequalled in this specific field of production by any other manufacturer of similar equipment*, will give Iowa an experience that will mean aggregate producing equipment that will be ever *more profitable* for the American contractor.

Talk to contractors that are using Iowa aggregate and asphalt plants. Check the records that Iowa plants are establishing for production. Find out about Iowa's low operating and maintenance costs.

Whether it is crushers, screens, bins, asphalt plants, driers or washing plants, Iowa is Headquarters for aggregate reduction and handling equipment. Can we help you with your plans?

THE IOWA LINE

of Material Handling Equipment Includes

- | | |
|--------------------------------------|---------------------------|
| ROCK AND GRAVEL CRUSHERS | PORTABLE GRAVEL PLANTS |
| BELT CONVEYORS — STEEL BINS | REDUCTION CRUSHERS |
| BUCKET ELEVATORS | BATCH TYPE ASPHALT PLANTS |
| FEEDERS — TRAPS | DRAG SCRAPER TANKS |
| PORTABLE PLACER MACHINES | WASHING PLANTS |
| PORTABLE POWER CONVEYORS | TRACTOR-CRUSHER PLANTS |
| PORTABLE STONE PLANTS | STEEL TRUCKS AND TRAILERS |
| TRAVELING (ROAD MIX) PLANTS | KUBIT IMPACT BREAKERS |
| VIBRATOR AND REVOLVING SCREENS | |
| STRAIGHT LINE ROCK AND GRAVEL PLANTS | |

IOWA MANUFACTURING CO., Cedar Rapids, Iowa



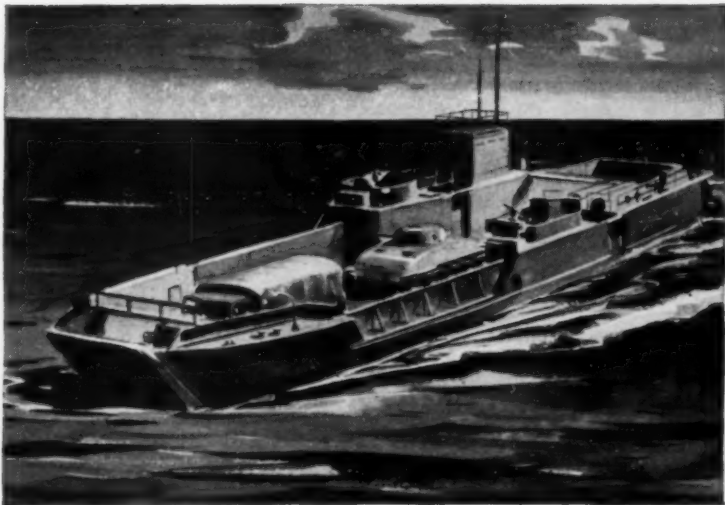
LCM (Landing Craft Mechanized) 50 ft.



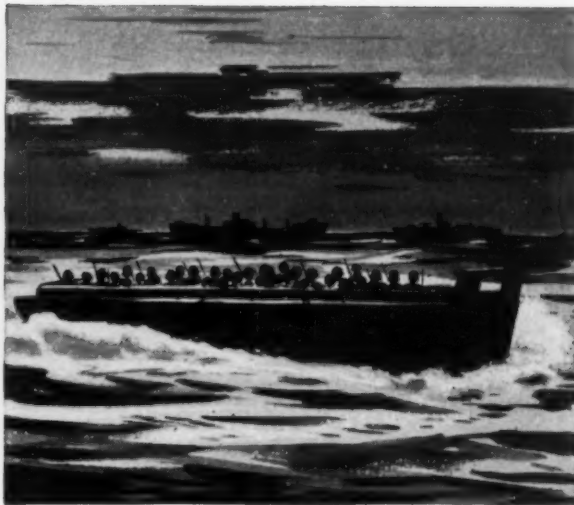
LCI (Landing Craft Infantry) 157 ft.

LST (Landing Ship Tanks) 328 ft.





LCT (Landing Craft Tanks) 105 ft.



LCV(P) (Landing Craft Vehicle Personnel) 36 ft.

AMERICA'S FIGHTERS MOVE IN —WITH GM DIESELS

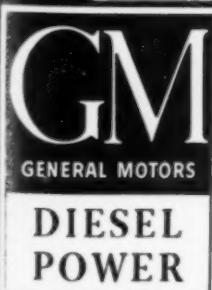
IN the face of enemy fire these remarkable invasion boats nose in on enemy shores and pour out America's tough fighters and fighting equipment.

They move on split-second orders—must get in and out again by themselves—on the dot, come hell or high water.

It's the kind of service that calls for utmost reliability and quick response.

In these capable craft—from the 36-foot LCV(P) to the big 328-foot LST—you find the engines America and our Allies know so well, General Motors Diesels.

To these engines are assigned the jobs that call for the greatest dependability the engine world knows.



ENGINES . . . 15 to 250 H.P. . . DETROIT DIESEL ENGINE DIVISION, Detroit, Mich.
Engines of this series power the LCI and all the smaller landing craft

LOCOMOTIVES ELECTRO-MOTIVE DIVISION, La Grange, Ill.
Engines from this Division propel the giant LST vessels

ENGINES . . 150 to 2000 H.P. . . CLEVELAND DIESEL ENGINE DIVISION, Cleveland, Ohio
More than 40 types of Navy vessels are powered by engines of this Division

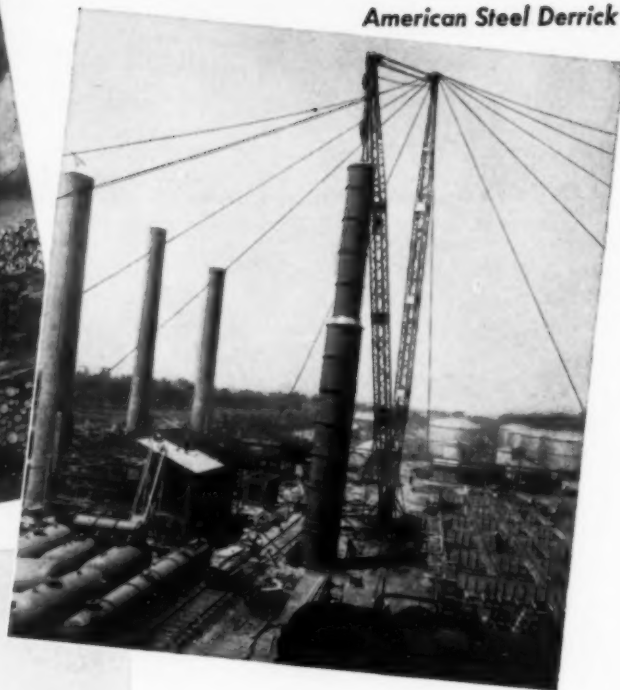
American

MATERIALS HANDLING for EVERY INDUSTRY

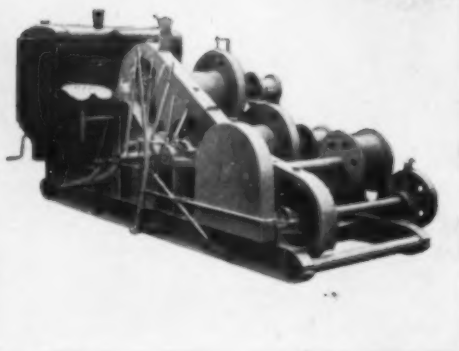
American Locomotive Crane



American Steel Derrick



American Revolver—Revolving Crane



American All Purpose Hoist



441

DESCRIPTIVE LITERATURE UPON REQUEST →

Plan now, but wait for American!

AMERICAN

MATERIALS HANDLING for EVERY INDUSTRY

AMERICAN HOIST & DERRICK CO.

SAINT PAUL 1, MINN.

CHICAGO

SAN FRANCISCO

NEW YORK

AMERICAN TERRY DERRICK COMPANY, South Kearny, N. J.



Wherever
wire rope is fastened
... use genuine
CROSBY CLIPS
with the Red-U-Bolt

TAKHINI RIVER BRIDGE on the Alaska Highway, built with the Teco Connector System of Construction.



THE ARMY BUILDS WITH WOOD

Spanning rivers and gorges along the Inter-American and Alaska Highways are many modern bridges built of treated timber prefabricated and engineered under the Teco Connector System of Construction.

The Army Engineer Corps has demonstrated the advantages of timber construction for—Strength—Economy—Permanence—not only in bridge construction but in hangars, warehouses, towers and other industrial types of structures.

These advantages are yours for present and post war planning.

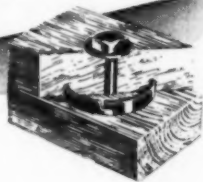
THE KISKATINAW RIVER BRIDGE, one of the major crossings on the Alaska Highway, designed by the U. S. Public Roads Administration. The timber superstructure was prefabricated and pressure-cresoted by the Canada Cresoting Co. The Timber Connector System was used.



Specify
TECO
CONNECTORS AND TOOLS

Endorsed by Leading Lumber Manufacturers and Fabricators

TECO Grooving Tools are manufactured exclusively by Greenlee Brothers & Company—one of the world's largest manufacturers of wood-working tools.



BUILDING TIMBER BRIDGES
With The TECO System



**FREE
PICTORIAL BOOK**

Shows the Government's extensive use of timber in bridge construction in the United States and Canada.

TIMBER ENGINEERING COMPANY
NATIONAL MANUFACTURERS OF TECO TIMBER CONNECTORS
WASHINGTON CHICAGO MINNEAPOLIS NEW ORLEANS PORTLAND

TIMBER ENGINEERING COMPANY
1319 18th St., N. W., Washington 6, D. C.

Please send me by return mail a free copy of "Building Timber Bridges With The Teco System."

Name.....

Firm Name.....

City..... State.....

**THIS SUMMER
THE "HEAT" WILL
REALLY BE ON!**



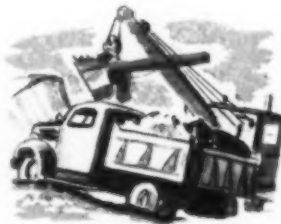
**Switch to the Extra Protection of
ALEMITE Summer Lubricants**

IT'S BEEN the toughest winter in construction history. But from now on, the "heat" will *really* be on. Equipment will have to "take it" on "impossible" schedules, regardless of summer heat and

'round-the-clock operation. Inexperienced help may innocently tear machines to pieces. And parts are mighty hard to get. That's why you need the extra protection of Alemite Summer Lubricants.

ALEMITE GEAR LUBRICANTS

Risking gears this summer means risking a whole machine. Alemite Gear Lubricants withstand terrific heat and pressures and still protect hard working surfaces. Regardless of working conditions, Alemite Gear Lubricants "stay put" because they're "super-tacky."



ALEMITE MOTOR OIL

Twenty-four hour operation wears out oil fast. Alemite Summer Grade Motor Oils are 100% pure Bradford Pennsylvania crude stock—the toughest known. Alemite adds a special heat-resisting quality that is vital to the safety of equipment. Available in all grades.

ALEMITE PRESSURE GUN LUBRICANTS

Whether the fitting calls for a pin-point or spoonful, there are special and all-purpose Alemite Lubricants for the job. As pioneer in pressure lubrication, Alemite has developed lubricants to resist heat, last longer and save your machines.



ALEMITE No. 33 LUBRICANT

An Alemite exclusive! Developed to provide a working temperature range from 25° below to 205° F. Ideal for equipment where bearing loads are high, and resistance to rain and muck is vital. Can't clog grease guns or bearing lubricant grooves. Lasts longer.



Call in the Alemite Lubrication Specialist to explain his modern lubrication set-up for greater protection this summer. If you cannot locate him, write for his name and address. Alemite, 1840 Diversey Parkway, Chicago 14, Ill., or Belleville, Ont.

ALEMITE

First in Modern Lubrication

LUBRICANTS • EQUIPMENT • MAINTENANCE • ENGINEERING • CONSULTATION





Continuous RIBBONS OF RESPONSIBILITY



Drawings show how even a big movement of the wheel is smoothed out at points X on first course and XI on second course.



As the last smooth run is being completed by a Foote Adnun paver, two shiny black continuous ribbons appear briefly—a trademark to signal the completion of the job. It is almost as if the machine itself were saying: "There you are boys, smoothly finished!"

These ribbons actually are the marks of the two rear rollers, that appear only after the mix has been put down with a paperlike smoothness and finish. They disappear completely with rolling.

It is important to note that Adnun rollers *do* run on the finished surface, because it is this feature of Foote design which provides a smoother finish. We call it "Continuous Course Correction."

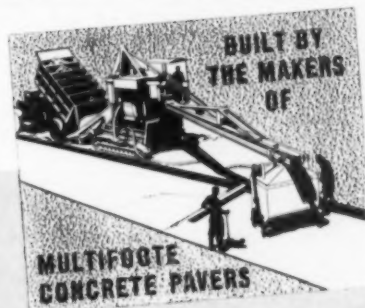
Note in the two diagrams how the Adnun wheels and rollers reduce irregularities to insignificance. A large movement at the wheels is changed into a very small one at the cutter bar. With each successive course, the smoother the surface becomes.

Identify Adnun quality performance by these marks of a smooth job. Continuous Course Correction produces a smooth surface whether the machine is laying Black Top, or crushed rock, slag, or gravel.

THE FOOTE CO. INC. NUNDA, N. Y.

ADNUN
TRADE MARK REGISTERED
BLACK TOP PAVER

WITH CONTINUOUS COURSE CORRECTION



What type **HOIST** *will you require?*

Post war plans include many construction projects of various sizes and descriptions. These programs will demand more efficient and dependable hoisting equipment to cope with the stepped-up building tempo created by war time construction methods.

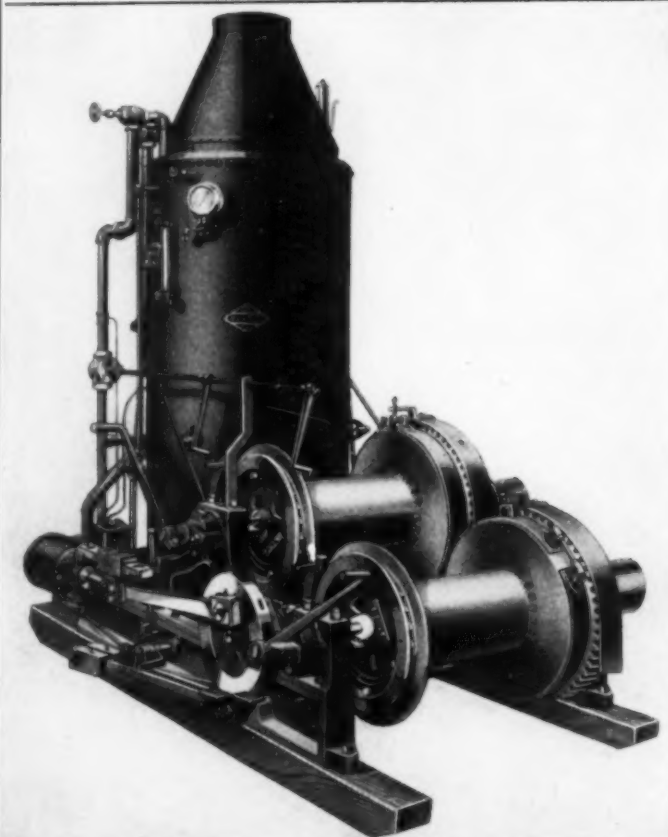
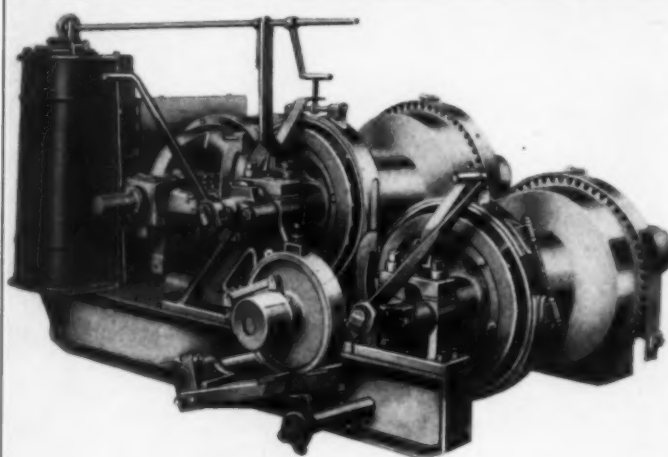
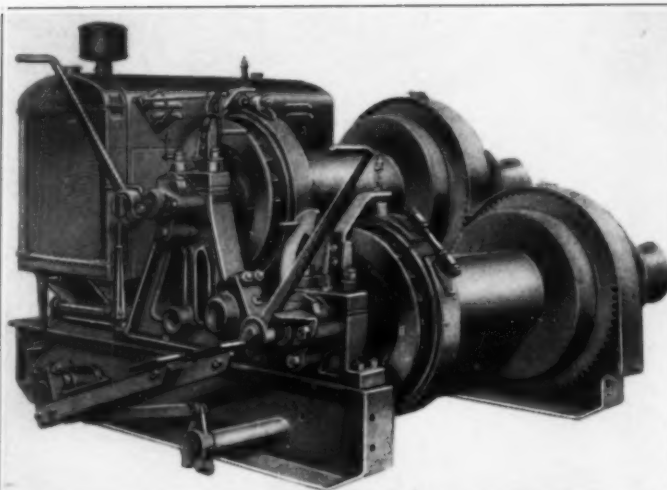
Clyde Equipment, geared to meet the needs of tomorrow, will be the solution to your hoisting problems. Designed for performance . . . built for endurance has always been the keynote of Clyde construction.

CLYDE GASOLINE HOISTS, are manufactured in one, two and three drum types with line pulls ranging from 1500 lbs. to 14,000 lbs. Practical, common-sense engineering governs their design . . . strength without useless dead weight; economy without sacrifice of performance. Write for Bulletin K-4 for complete information.

CLYDE ELECTRIC HOISTS are basically the same as gasoline hoists with the exception of the power units. Capacities range from 1000 lbs. line pull to 20,000 lbs. Sturdy, well built machines that are ideal for every type of hoisting duty. Bulletin K-3 contains full description.

CLYDE STEAM HOISTS are rugged and efficient units and are available in sizes from 3000 lbs. to 20,000 lbs. line pull. All Clyde two and three drum hoists can be equipped with a boom swinging attachment.

Write for Bulletin K-2 for specifications.



CLYDE IRON
DULUTH, 1

WORKS, INC.
MINNESOTA



**A FEW CENTS AN HOUR OPERATES A
BARCO PORTABLE GASOLINE HAMMER**



FIELD POST DRIVING



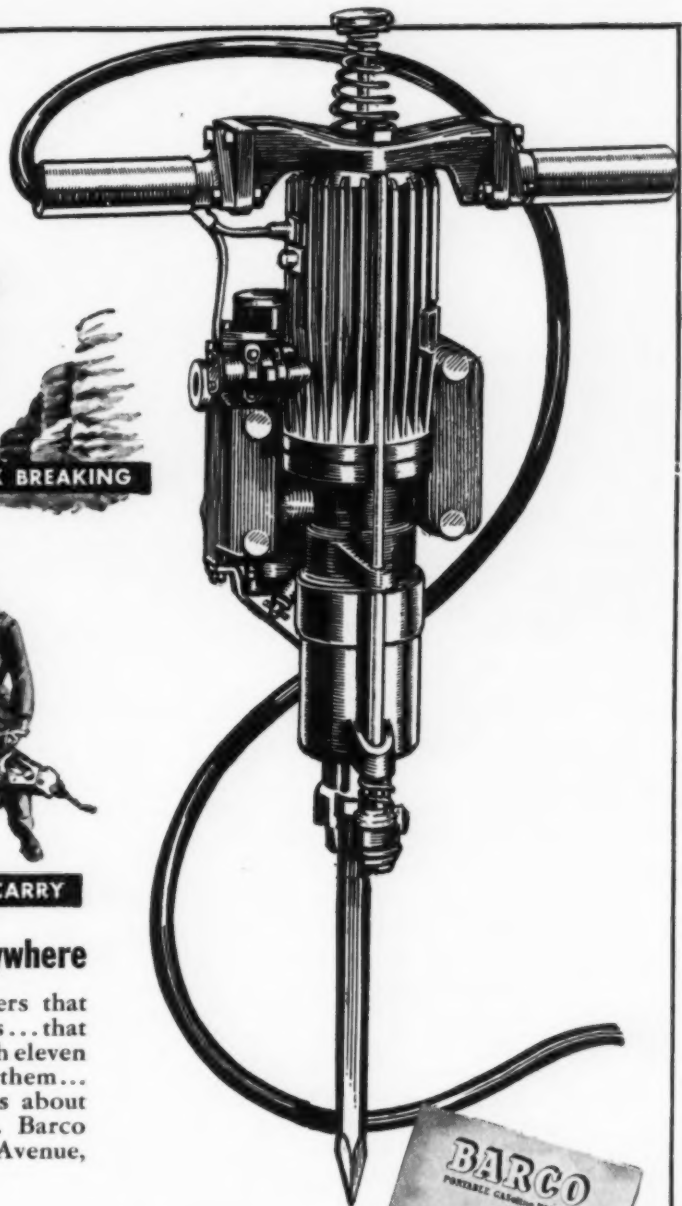
ROCK BREAKING



TAMPING



EASY TO CARRY



Makes Tough Jobs Easier...Can Be Carried Anywhere

Amazing things...these Barco Portable Gas Hammers that cost so little to operate and handle so many big jobs...that carry like lightweights and punch like heavyweights! With eleven special tool attachments, every job is made to order for them...whether it's breaking, driving or tamping. Consult us about your problems...our engineers are at your service. Barco Manufacturing Company, Not Inc., 1812 Winnemac Avenue, Chicago 40, Illinois.

BARCO

PORTABLE GASOLINE HAMMERS

Light in Weight & Rugged in Construction

BARCO MANUFACTURING CO., NOT INC.
1812 Winnemac Ave., Chicago 40, Ill.

Gentlemen:

Without obligation on my part please send me a copy of the
BARCO HAMMER BOOKLET.

Name _____

Street _____

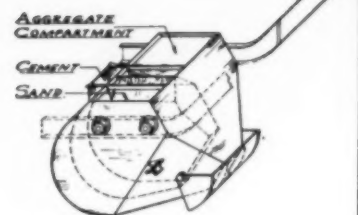
City _____ State _____



Quickly Set Up for Operation at the Most Advantageous Point in the Pouring Area

• The Johnson Porto-Batcher is a *complete* highway portable batching plant. Its use permits these substantial time and money savings:

- 1 The Johnson Porto-Batcher can be towed behind a truck to the most advantageous point in the pouring area.
- 2 Since the Porto-Batcher is quickly set up for operation, long hauls of mixed concrete are eliminated . . . the number of mixing units is reduced and the number of concrete yard miles lessened. Control of all operations is centralized.
- 3 All materials are delivered to the batching unit in bulk material trucks . . . eliminating extra handling equipment.
- 4 The Johnson patented skip permits full utilization of mixer capacity. By providing proper intermingling of aggregates with cement when discharged into mixer, it assures pre-mixing and pre-shrinkage . . . prevents cement from touching wet mixer opening and walls thus eliminates gumming and excessive wear.
- 5 All levers are grouped in one central location to permit control of operations by one man. Write for bulletin.



CHARGING SKIP

The Johnson charging skip has a capacity of 43 cubic feet . . . 33 cubic feet for aggregate and 10 cubic feet for cement. The aggregate from the three storage compartments reaches the skip through three fill valves. The cement and each size aggregate is weighed on a separate weigh beam. The cement compartment is completely sealed to avoid contact of the cement with the wet aggregate. Batching cycle 90 seconds.

Write for Data on
Johnson's
READY-MIX PLANTS
BULK CEMENT HANDLING
EQUIPMENT
CEMENT STORAGE BINS
CONCRETE BUCKETS
BATCHERS

the C. S. JOHNSON COMPANY
CHAMPAIGN • ILLINOIS

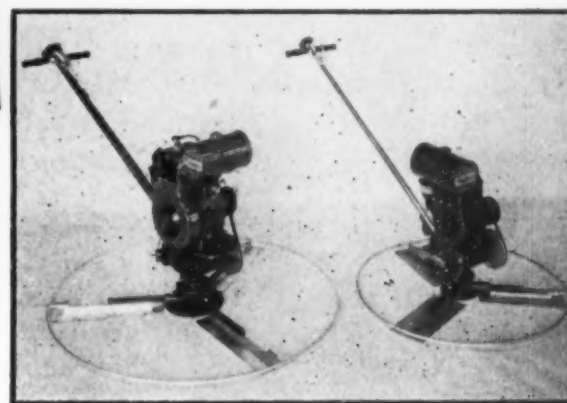
NEW

A Lightweight WHITEMAN Concrete Finishing Machine



Conserves Manpower, Reduces Costs on Small Concrete Floating and Finishing Jobs

Model "J" Whiteman Lightweight floating and finishing machine for small or congested areas. Interchangeable trowels permit both floating and finishing with one dual-purpose machine. One man can cover 750 sq. ft. in 15 minutes.



Model "B" (at left) Whiteman dual purpose floating and finishing machine is for large areas—the new Model "J" (at right) is for smaller work.

To float and finish small or obstruction-congested concrete slab areas, Whiteman now offers the Model "J", 34-in. diameter power-driven float and finisher. Utilizing the same principle as the job-proved Whiteman Model "B", the new machine with rapidly rotating adjustable trowels, multiplies the work capacity of your crews, produces stronger, better finished concrete surfaces. Designed specifically for small areas, the Model "J" gives the small or large contractor the cost and labor-saving advantages of mechanized slab treatment.

One of the first contractors to purchase the Model "J", after three weeks' use, placed a re-order for six additional machines.

Manufactured by the developers of today's mechanized concrete slab placement equipment — Whiteman Rodding Machines, dual-purpose Floating and Finishing Machines — the Model "J" Lightweight Float and Finisher now meets the need on small jobs.

Write or wire today for performance data and name of your nearest distributor.

The new lightweight Whiteman Float and finisher provides all of the economies of the Standard Whiteman dual-purpose floating and finishing machine—adds four features:

1. **EASY OPERATION**, small size enables even inexperienced operator to handle with ease.
2. **SMALLER DIAMETER TROWEL** (only 34") permits operation in small crowded areas, even around pipes and similar obstructions.
3. **LIGHT WEIGHT** (only 118 lb.) provides maximum portability—operator can carry from room to room, or transport between jobs in automobile trunk compartment. Light Weight also permits earlier start on floating operation, thus cutting slab finishing time.
4. **LOW COST** makes this a profit-producing investment for even the smaller contractor.

Whiteman MANUFACTURING CO.
3249 Casitas Avenue Los Angeles 26, California

The MORETRENCH WELLPOINT System is used to predrain wet excavation on a wide variety of projects

7 FOR EXAMPLE,
HERE ARE A FEW
RECENT
INSTALLATIONS

GASOLINE TANK FOUNDATIONS KENOSHA, WIS.
NAVAL AMMUNITION DEPOT MONMOUTH CO., N. J.
DRY DOCK BASIN WILMINGTON, N. C.
SEWER CONSTRUCTION NORFOLK, VA.
PIPE LINE RIVER CROSSINGS OKLAHOMA AND KANSAS
POWER PLANT PENSACOLA, FLA.
BUILDING FOUNDATION STRATFORD, CONN.
OIL TANK FOUNDATIONS NORFOLK, VA.
HOT METAL TUNNEL RECONSTRUCTION INDIANA HARBOR, IND.
UNDERPINNING FOUNDATIONS PASSAIC, N. J.
SEWAGE PUMP STATION FLINT, MICH.
WATER PUMPING STATION NEWARK, O.
WATER SUPPLY FOR SWIMMING POOL PARAMUS, N. J.
CAISSON SHAFT BALTIMORE, MD.

★
Whether your job is large or small, usual or unusual, we'll welcome the opportunity to help you — as long as it's WET! A-1 equipment, years of experience, trained personnel enable us to guarantee dry subgrades on every MORE-TRENCH job.

★

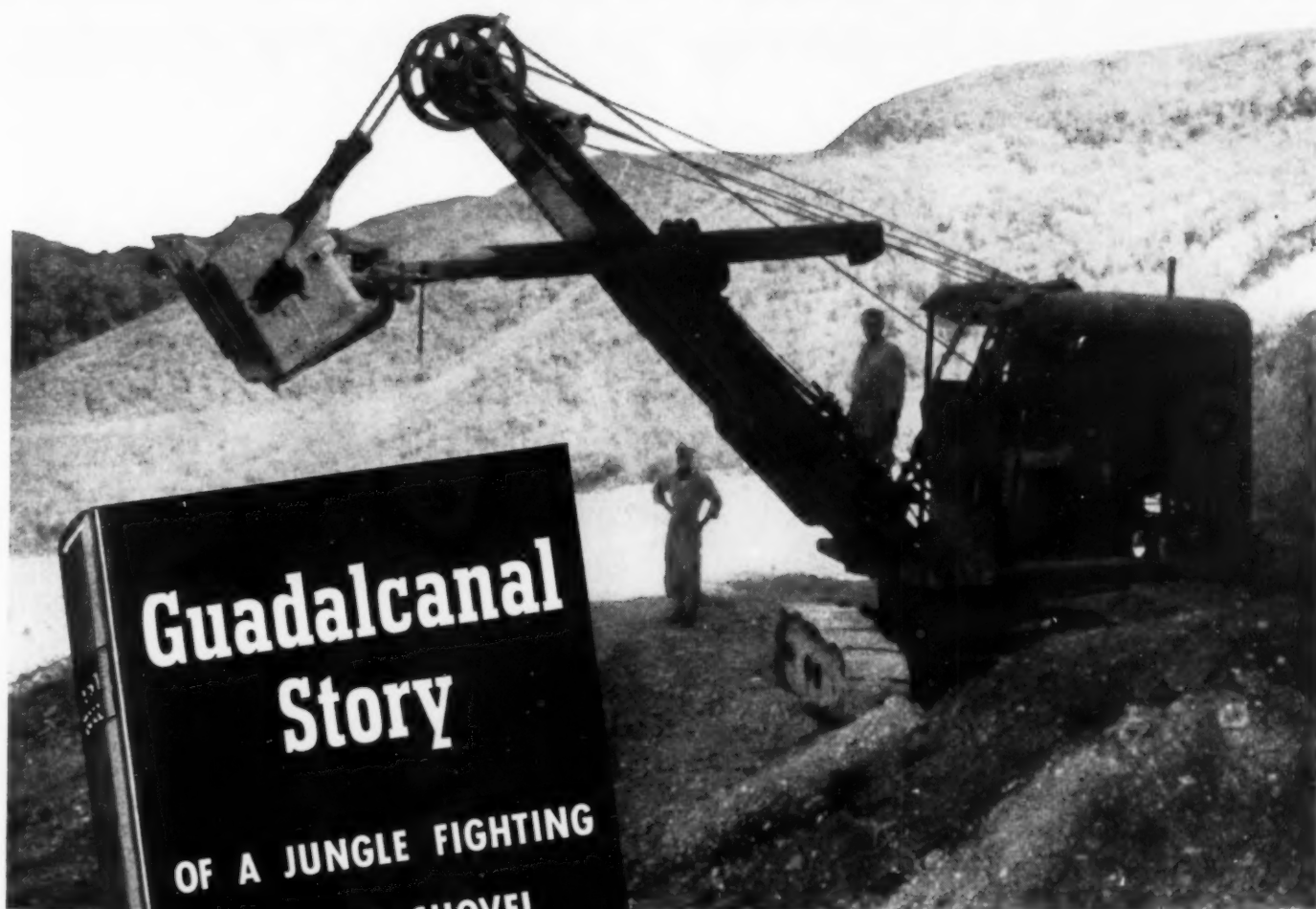
MORETRENCH CORPORATION

90 WEST STREET, NEW YORK 6

CHICAGO, ILL.

ROCKAWAY, N. J.

NEW ORLEANS, LA.



From fighting fronts come many tales of gallant deeds, and not infrequently we have reports of outstanding performance where the fighting man's equipment also plays an important role. One such story is told by a soldier on duty in the southwest Pacific area . . . the story of an Osgood Shovel.

" . . . it cleared the path into the jungles for the men. They also used it in the coral pits to dig out the coral for the roads, which was just as hard as cement and a darn hard job to dig. But the old boy did its job OK without a breakdown."

Osgoods are dipping their buckets deep into this globe-girdling combat. Their ruggedness, power, speed and mobility (Osgood measured air control) are winning for them the title of "fighting man's friend." Why not investigate Osgood now for dependable post-Victory performance?

**Preventive maintenance will keep rolling stock "in Action."
War Bonds will supply the equipment to keep the "Action" in our favor!**

**The
GENERAL
EXCAVATOR CO.**

Sizes: $\frac{3}{8}$ - $\frac{1}{2}$ - $\frac{5}{8}$ - $\frac{3}{4}$
DIESEL - GAS - ELECTRIC

— • —

Associated with
THE OSGOOD CO.

**The
HERCULES
COMPANY**

HERCULES
IRONEROLLERS
6 to 12 Tons
Diesel or Gasoline

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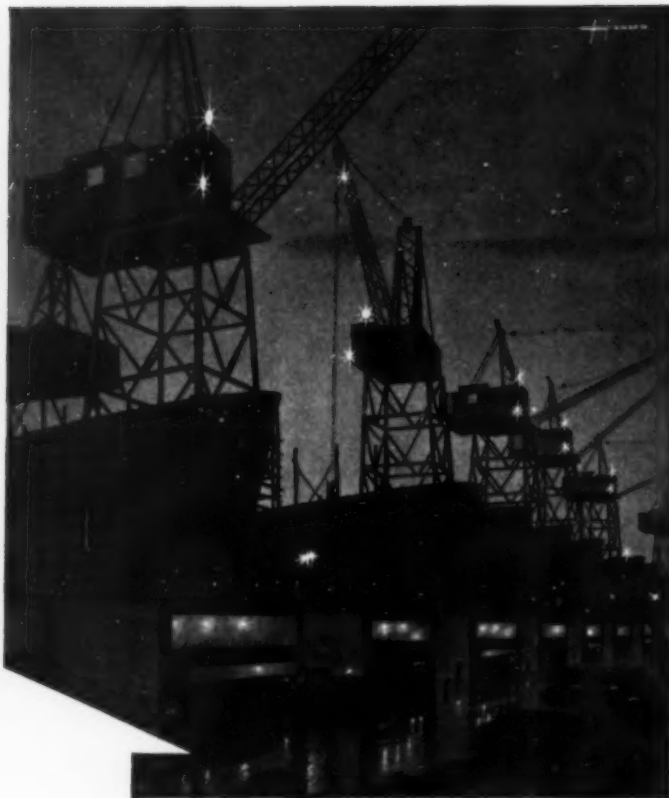
Associated with
THE OSGOOD CO.

OSGOOD

Sizes:
 $\frac{1}{2}$ to $2\frac{1}{2}$ Cu. Yd.
Diesel - Oil - Gas - Electric

**SHOVELS
DRAGLINES - CRANES
Crawler & Wheel Mounted**

THE OSGOOD COMPANY, Marion, Ohio



WHY Form-Set Purple Strand is still hard to get

No need to tell wire rope users that wire rope is hard to get.

You've been telling us!

But perhaps you'd like to know why, when consumers of some other products are looking toward easing of restrictions, wire rope is still tight. Here are some of the reasons:

The shipbuilding program, with its emphasis on landing craft, will continue to make heavy inroads on wire-rope production. And so, of course, will the year's stepped-up military and naval operations. Further, the country's 1944 oil program contemplates an increase of from 18,000 to 24,000 wells — and for

wells so much deeper than ever before that oil-country demands for wire rope will leap upward from 80 to 100%.

We therefore make this suggestion: Figure your wire rope needs (and place your orders) as far in advance as possible. This offers the best assurance that the wire rope you are going to need through the year will be on hand when you need it.

And while you're thinking about wire rope, think of Form-Set Purple Strand.

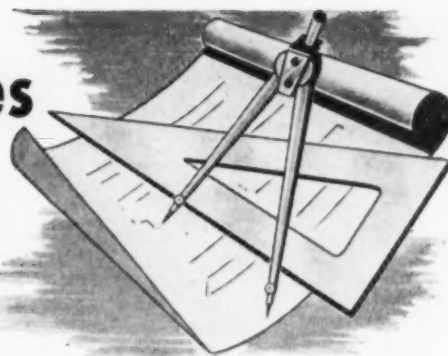
"Purple Strand" means that the rope is made of "Improved Plow" steel, the strongest, toughest steel used in wire-rope manufacture.

"Form-Set" means that the wire rope is preformed, making it not only rugged but far easier to handle. Preformed wire rope gives longer service because it is much better able to stand bending fatigue.

Form-Set Purple Strand is Bethlehem's top-quality wire rope. It is made in all sizes and constructions. For the utmost in flexibility and ruggedness, and long service life, call for Form-Set Purple Strand.



JAEGER offers these figures to POST-WAR PLANNERS

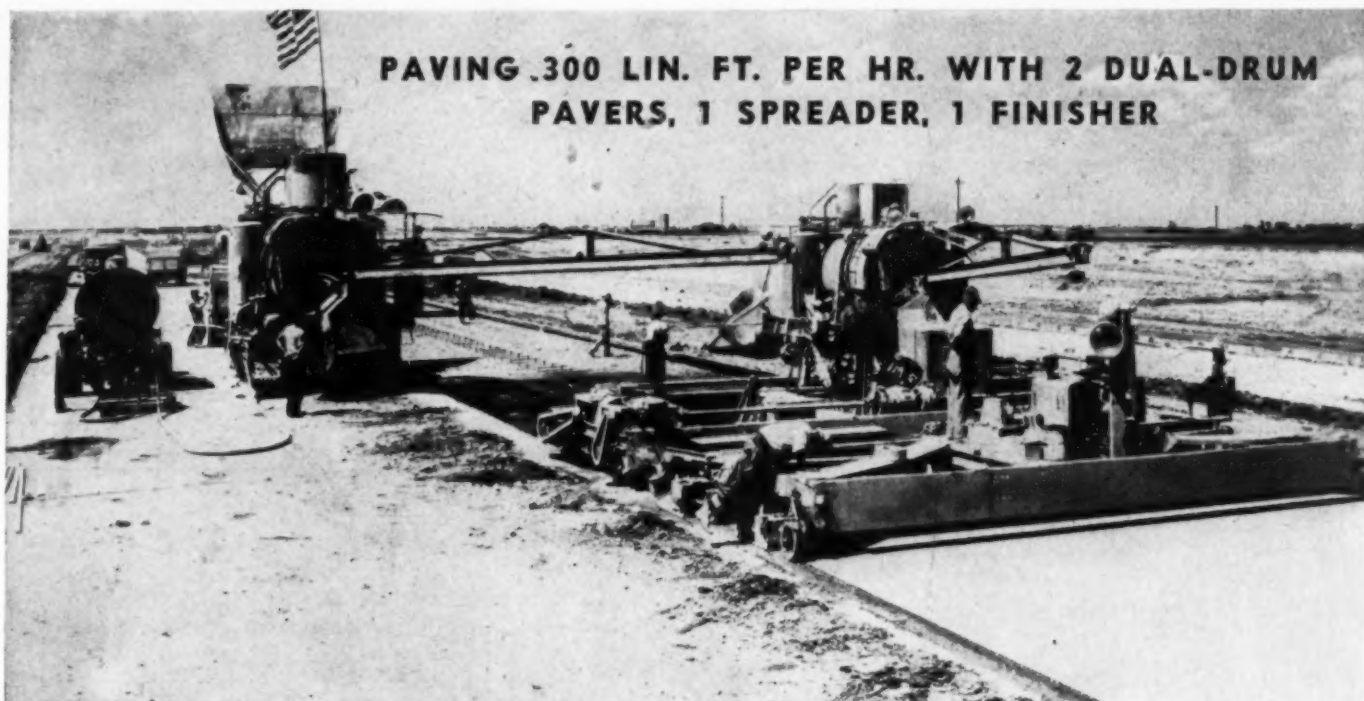


Compared with the last World War year of 1918, the placing and finishing of concrete highways and airports is now being accomplished **6 to 10 times faster** and at approximately **one half the cost per yard.**

This progress, already achieved to meet war-time schedules, is directly due to the development by the paver industry of the dual drum paver and

the development, by Jaeger-Lakewood, of the mechanical concrete spreader and finisher — **the team that broke the bottleneck behind the paver.**

Planners of post-war projects and contractors who will build them will both be interested in the comparative figures offered below:



**PAVING 300 LIN. FT. PER HR. WITH 2 DUAL-DRUM
PAVERS, 1 SPREADER, 1 FINISHER**

HIGH PRODUCTION: In 1918 an hourly rate of 40 lin. ft. of 18 ft. slab (80 sq. yds.) was fast work for a paver and Lake-wood Finisher.

Today, runs of 300 ft. of 25 ft. slab (833 sq. yds.) per hour are being made by using two 34E dual drum pavers followed by one Jaeger Screw Spreader and one Jaeger-Lakewood Type "H" Finisher. On an Ohio glider base the pace of 314 ft. per hour was maintained for 17 hours, resulting in a single day's production of 5335 ft. of 25 ft. wide slab.

LONG LIFE: In 1918, from 30 to 40 miles of work wore out a finisher. Today's machine can do 150 to 200 miles in spite of much drier, harsher material, do 1,000,000 sq. yds. with the first set of screed shoes.

LOW COSTS: Comparing equipment

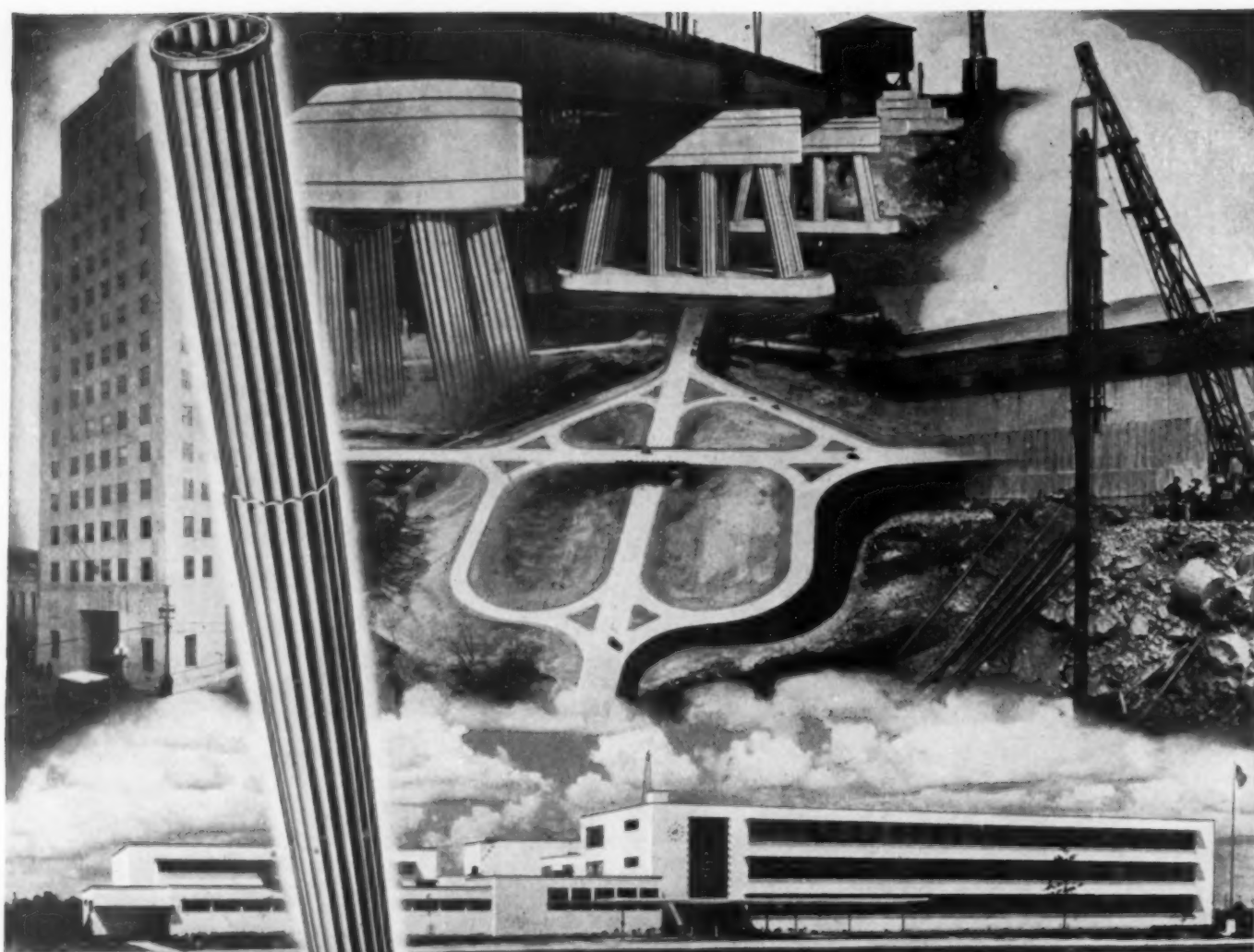
costs, a contractor today can buy one 34E dual drum paver, Jaeger Finisher and Spreader for the price of two 1918 pavers and finishers and, with this single outfit, do 3 times the day's yardage possible with two 1918 outfits and crews.

Finally, the cost per sq. yd. of pavement is approximately 50% lower — and the concrete is stronger, denser and far more uniform because mechanical handling permits dry vibratory mixtures and eliminates segregation.

THE JAEGER MACHINE COMPANY
800 Dublin Avenue Columbus 16, Ohio

JAEGER Engineered EQUIPMENT

ALSO "SPEEDLINE" MIXERS, "SURE-PRIME" PUMPS, "DUAL-MIX" TRUCK MIXERS,
JAEGER HOISTS, "FLEET-FOOT" CRANE-LOADERS,
"AIR-PLUS" PORTABLE COMPRESSORS



Many of America's
Biggest Projects are
"Based" on
MONOTUBES...

NO matter what the job, Monotubes assure engineers and contractors *speed with safety* in the installation of cast-in-place concrete piling.

Sturdy and rigid, yet light in weight and easy to handle, these all-steel, tapered, fluted pile casings take much of the guesswork out of foundation construction.

Monotubes require no heavy core or mandrel and can be driven with average job equipment; their hollow, tubular design permits easy, thorough inspection prior to concreting; and Extendible Monotubes are available for the installation of varying pile lengths.

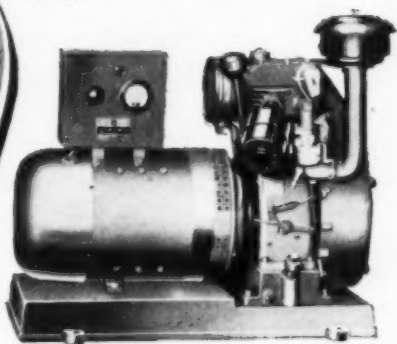
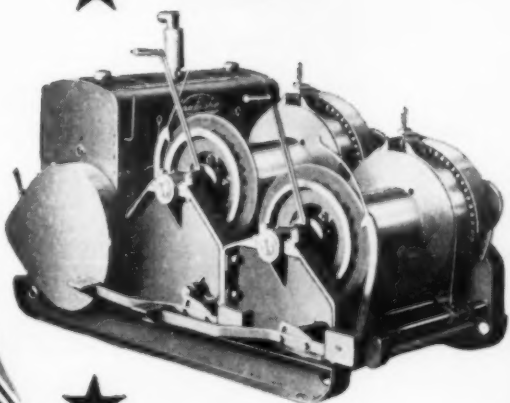
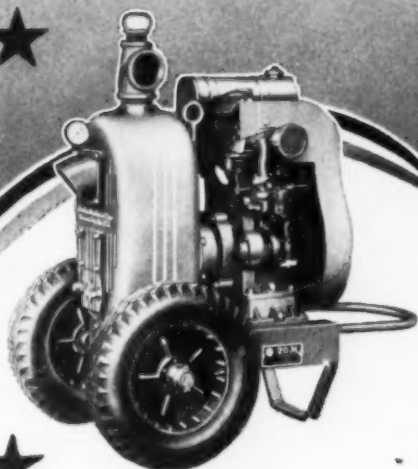
Available now for war construction and, after the war, for *all* construction, in a gauge, size, and taper to meet all requirements. Write for Catalog 68A. The Union Metal Manufacturing Company, Canton 5, Ohio.

UNION METAL

Monotube Pile Casings

STERLING

PUMPS • HOISTS • LIGHT PLANTS



a **BUY** word FOR LEADING CONTRACTORS

Yes — **STERLING** is a name that stands for quality and value wherever Pumps, Hoists and Light Plants are used... the choice of leading contractors everywhere because of their **RUGGED** construction, **SIMPLE** operation and **DEPENDABLE** performance.

★ ★ **PUMPS** ★ ★

A size for every job from 1½" to 10" and several models and types in each size. Due to heavy demands for Sterling Pumps we have doubled our production and can make prompt shipment on most models.

★ ★ **HOISTS** ★ ★

When a job requires a hoist that will stand up day after day under hard use and heavy loads... the choice should be **STERLING**... recognized by contractors everywhere for their outstanding achievements.

★ **LIGHT PLANTS** ★

For light and power on construction jobs or for permanent installations... select **STERLING** Generating Plants. Made in sizes ranging from 100 to 75,000 watts... ruggedly constructed to give long dependable performance. Immediate shipment on many sizes.

See Your Sterling Distributor

Write for Literature Today.

Allied Member A. E. D.
Member Contractor's Pump Bureau A. G. C.



Sterling

MACHINERY CORPORATION

405-13 SOUTHWEST BLVD. KANSAS CITY 10, MO.

ALWAYS ON THE JOB

from the jungles of New Britain to the shores of Italy

YES, we mean the three big Goodyear work tires you see below. If you watch the newsreels, you'll be surprised how many times you see these famous treads on equipment being landed by America's invading forces.

Goodyear off-the-road tires are widely used by Navy Seabees and Army Engineers for jungle-clearing, road- and airfield-building, and all heavy-duty earth-moving jobs, for the same reasons that make them first choice of contractors here at home.

Supertwist, All-Weather, Sure-Grip—T.M.'s The Goodyear Tire & Rubber Company

They're built for tough going — armored with low stretch Supertwist cord; toughened by multiple compounding. They're big — with enough flotation to carry heaviest loads safely. And their treads are scientifically designed to provide maximum traction in sand, mud, marsh or rocky going.

Best proof of that is the fact "more tons are hauled on Goodyear truck tires than on any other kind." Today it's more important than ever to specify Goodyears — because Goodyear's experience

as the world's largest tire builder insures a "plus" in quality you won't find elsewhere. —

GET THIS FREE GUIDE TO BETTER TIRE SERVICE

It's a MUST manual for wartime contractors — **SEND FOR FREE COPY** — Goodyear's *Off-the-Road Tire Manual* tells you what you need to know about getting the most wear out of your tires. To get your free copy of this fact-filled service handbook on proper tire care and maintenance, write Goodyear, Dept. SP, Akron 16, Ohio.



Goodyear's sound slide film on truck tire conservation is available for showings to group meetings of your drivers and maintenance men. Your Goodyear dealer or serviceman will be delighted to show it to your employees. Ask him about it.



PRODUCTS OF
GOODYEAR
RESEARCH



MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY

OTHER KIND

Construction Methods

ROBERT K. TOMLIN, Editor

Volume 26

MARCH, 1944

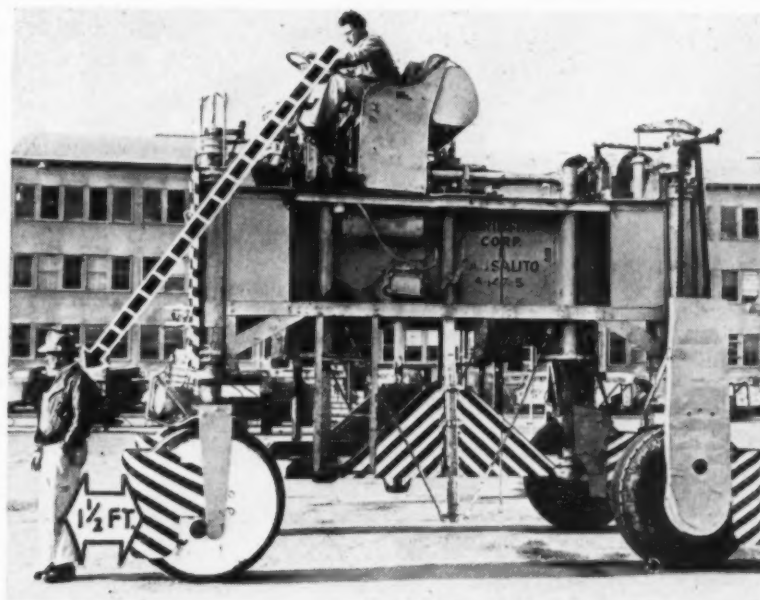
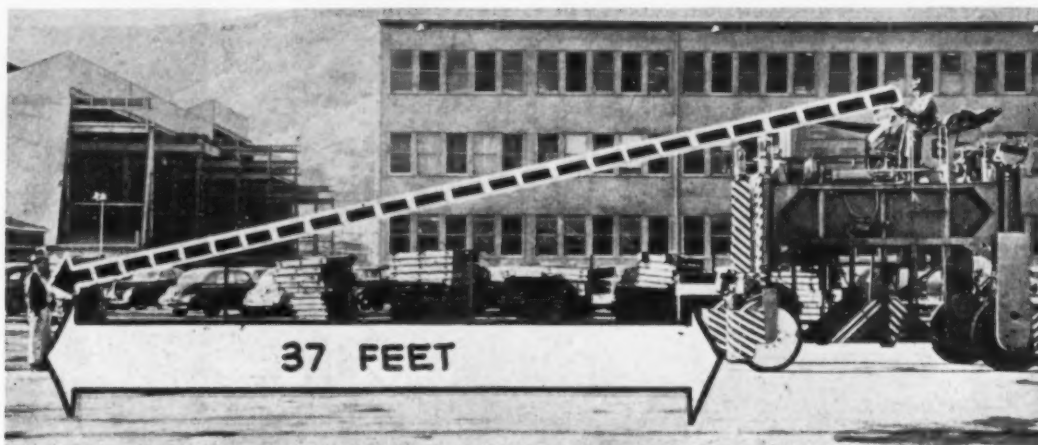
Number 3

Lumber Carrier Made Safer by Moving Operator's Seat Forward

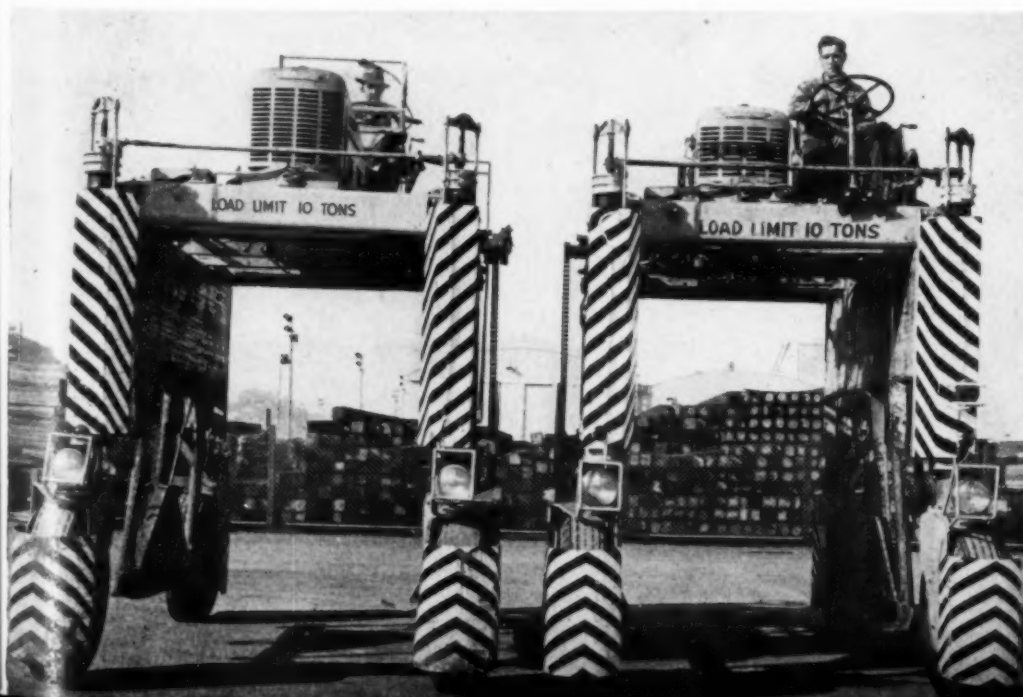
ACCIDENTS CAUSED BY LUMBER CARRIERS striking workers in the congested yard areas of Marinship Corp. in California have led to a rearrangement of the driver's seat on these vehicles with resultant increase in safety. In the original position, as shown in the left of the pair of views, the motor hood caused a blind spot in the driver's field of vision and workmen standing as far as 37 ft. ahead of the vehicle might be concealed from the driver. Although a bell rings automatically when the machine is in motion, many accidents were caused by workers being close to the machine while it was standing. Here, where they could not be seen by the driver, they had a minimum of warning from the bell as the vehicle started up.

Rearrangement of the control mechan-

BEFORE-AND-AFTER POSITIONS (above and right) of driver's seat that was changed to increase visibility and safeguard shipyard workers.



FRONT-END VIEWS (below) of original and remodeled lumber carrier at shipyard.



ism and placing the seat forward gives the driver an unobstructed view of everything beyond 18 in. ahead of the front wheels. There is still a blind spot at the rear, extending a maximum of 16 ft. behind the vehicle but, as these machines travel forward 80 percent of the time, there is great improvement in the new arrangement.

Other safety precautions include the painting of vertical surface on all four sides with black and white stripes; placing steel guards around all four wheels, headlights on both ends, two red tail lights, and a large 4-in. red blinker light on each end. The flick of a switch changes the lights from one end to the other. Above each wheel shines a special light, making the lumber carrier highly visible from every angle. There is also an automatic back-up horn that blasts whenever the truck is shifted into reverse.



ON LEDO SUPPLY ROAD TO CHINA, lead car of convoy bogs down and is rescued by tractor. American Army engineers are building double-lane supply route across northern Burma from India to China. *Acme Photo*

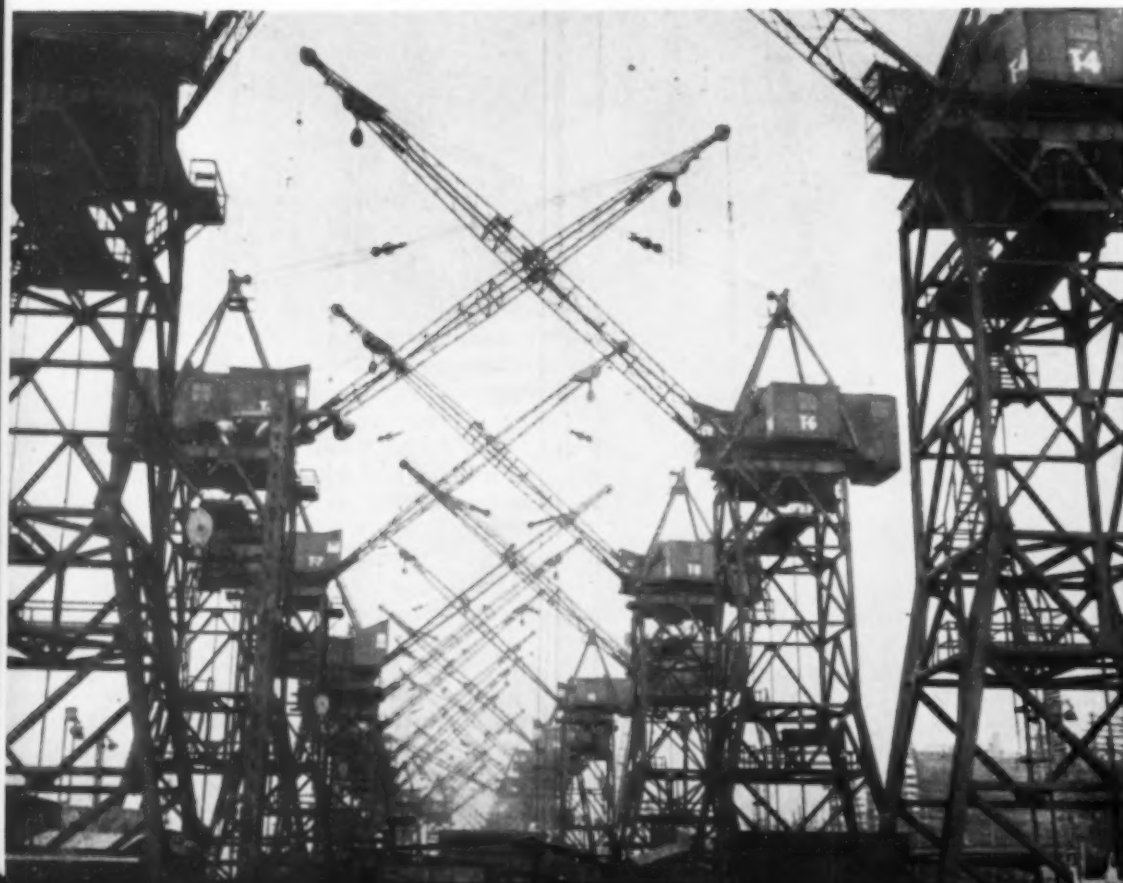
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FIRST SUNDAY OFF since start of war leaves huge gantry cranes (below) standing idle at Bethlehem-Fairfield shipyard at Baltimore, Md. In conformity with U. S. Maritime Service Commission ruling, yard's 16 shipways are deserted, except for maintenance crew. *Press Association Photo*

AMERICAN ROAD BUILDERS' ASSOCIATION, at its 41st Annual Meeting in Chicago, Feb. 1-3, devotes one session to panel discussion of "Disposition of Surplus War Equipment." Among speakers were (left to right): HAL G. SOURS, director of highways, Ohio; CHARLES M. UPHAM, en-

gineer-director, A.R.B.A.; G. W. VAN KEPPEL, president, Associated Equipment Distributors; E. I. KING, U. S. Treasury Dept.; A. R. GUIDER, Foreign Economic Administration; LT. COL. E. F. NEEDLES, chief, redistribution and salvage branch, Corps of Engineers; E. R. GALVIN, president, Manufacturers' Division, A.R.B.A. and general sales manager, R. G. LeTourneau, Inc.; A. E. O'BRIEN, executive secretary, Associated Pennsylvania Constructors; B. C. HEACOCK, presiding officer of session and chairman of executive committee, Caterpillar Tractor Co.





LIBERTY SHIP, built by Permanente Metals Corp. and named for 17th-century Dutch colonizer, is sponsored by **PRINCESS JULIANA** of the Netherlands. **CLAY P. BEDFORD**, (right) manager of company's four Richmond, Calif., yards, is presented to Her Royal Highness by **F. W. CRAANDYK**, (center) consul general of the Netherlands at San Francisco.



CANOL PROJECT ADVANCES as American builders connect up oil pipeline in Alaska. Pipeline, which will carry oil from Fort Norman oil fields in Canada to Alaska Military Highway at Whitehorse, is 600 mi. long.
Three Lions Photo



OUTSTANDING CONTRIBUTIONS to construction progress were honored by The Moles, New York organization of tunnel and heavy construction men, at annual Award Dinner, Feb. 2. (Left) **MALCOLM PIRNIE**, new president of American Society of Civil Engineers, congratulates **LT. GENERAL BREHON B. SOMERVELL**, Chief of Army Service Forces, on receiving non-member award. At right are **CHARLES B. SPENCER** (left), Award Committee chairman and vice president of Spencer, White & Prentis, and **ARTHUR A. JOHNSON**, Moles vice president and president of Arthur A. Johnson Corp., who won 1944 member award.



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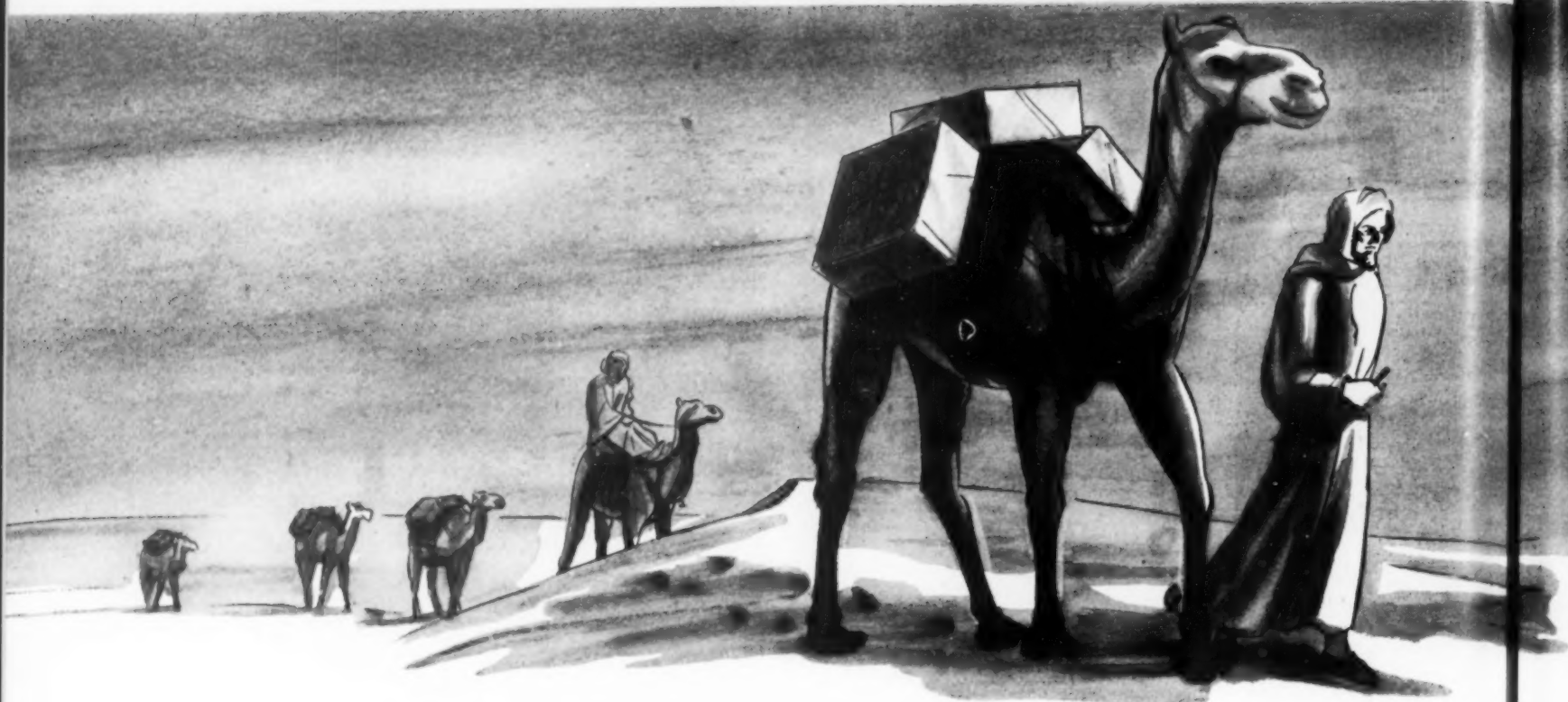
U. S. ARMY ENGINEERS in New Guinea (below) use American equipment to clear gravel and coral for taxiways on airfield. Machines working in jungle include bulldozers, rooter, tractor-scraper, crane and trucks.

European Photo

HANGAR NEARS COMPLETION (below) at newly constructed airfield "somewhere in England", which was built entirely by colored troops of U. S. Aviation Engineers.

British Combine Photo





CONSTRUCTION IN PERSIA

By American Contractors Provided
Docks, Camps, Roads and Bridges for
Army Use on Supply Route to Russia

By DONALD B. McKINLEY

Project Engineer
Foley Bros.—Spencer, White & Prentis, Inc.



LEADERS OF PERSIAN VENTURE are (left to right): CHARLES SELLS, foreign manager for contractors; EDWARD FOLEY, Foley Bros.; DAVID GIBONEY, Chief Engineer and EDMUND A. PRENTIS, of Spencer, White & Prentis.

FILL IS PLACED (below) for road across desert floor by Caterpillar elevating grader.



WORKING IN TEMPERATURES recorded as high as 150 deg. F., traveling across the submarine-infested oceans before protection had been organized as it is today, actually coming into contact with such dream subjects as "Cairo," "Punjabs," "Persia," "Caravans"—all of these and many other unusual incidents make the months centering around 1942 vivid in the memories of about 700 employees of Foley Brothers, Inc.—Spencer, White & Prentis, Inc., of New York. This group, consisting of construction men such as crane operators, dock-builders, truck drivers, mechanics, welders—and even cooks, recreation leaders, and a barber—to say nothing of superintendents, engineers, and office workers, were sent on a trip of 12,000 miles to inaugurate and, if possible, complete certain construction





NATIVE GANG of wire lathers sets steel reinforcement for concrete culvert pipe.

projects in Iraq and Iran, as ordered by the United States Army Engineers.

Though the work was planned and in the process of organization prior to the United States' entry into the war, that fateful Dec. 8, 1941, following the attack on Pearl Harbor, caused many changes in the original plans. For one thing, it became immediately evident that a civilian organization could not work effectively in a war theater. Consequently, the Army Engineers began to take over the work with their own troops, while the civilians carried on until this change could be accomplished. Today, the transformation has been completed and a military organization is carrying on the work not completed by the civilian contractors in the limited time at their disposal.

After the United States entered the war shipping became a very uncertain factor,

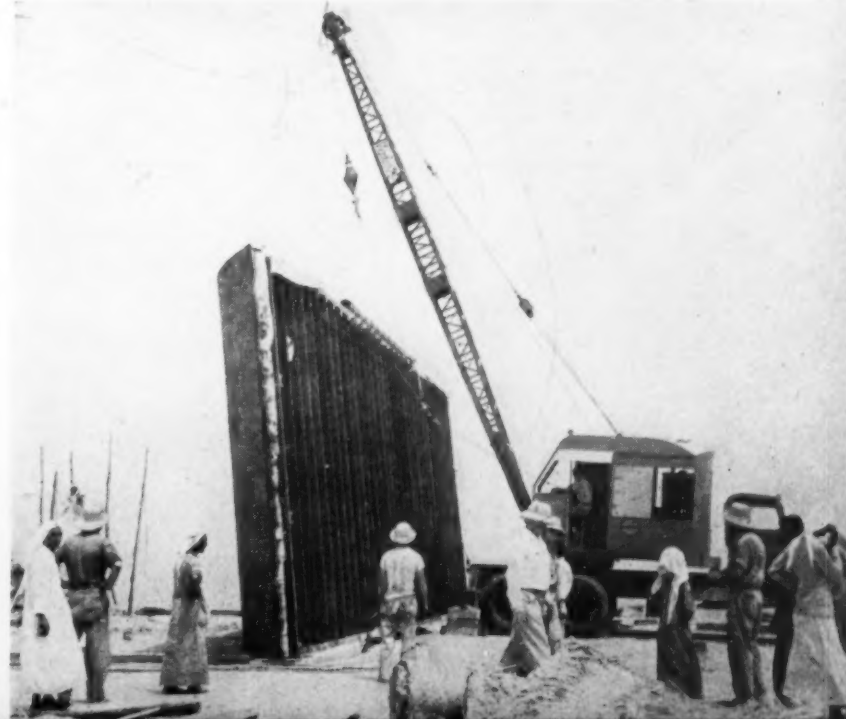


FLEET OF DUMPTOR TRUCKS haul fill. Koehring units are loaded by P&H shovel.

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TWO OF SIX PILEDRIVERS (below) are tied up to one of railroad approach trestles to dock structure. It was impossible to keep all piledrivers working at one time because of shortage of skilled man power.

WOOD BARGE (below) noted in previous picture is turned over by Link-Belt speeder truck-crane so that deck can be placed. This method saved many hours which would have been lost if over-head work had been necessary.





SIMPLE ROCK CRUSHING PLANT is operated by native labor.



ASSEMBLING PLANT (below) is provided at one of equipment yards scattered throughout area.



GROUPS OF NATIVE LABORERS (left) were used for many simple tasks, such as placing fill, stevedoring, etc. Many of the clothes that these men are wearing were given by American workmen on job.

STONE REVETMENT CONSTRUCTION is placed at points where critical culverts cross fill. Stone is bound with cement grout, as sufficiently large boulders could not be obtained in vicinity.



as the limited amount of cargo space had to be put to the most necessary uses. Under this handicap, men and equipment were sent by whatever means available. Any space, from a single passenger vacancy to a complete ship or plane, was utilized, no matter whether the ship was to sail from the east or west coast. Many a strange tale was related at the destination by new arrivals. Men told of such experiences as spending forty days at sea, with no stops, acting as crow's nest lookouts and members of gun crews, shooting at subs, "hitch-hiking" across Africa in R.A.F. planes, and traveling across the desert by train and bus. By some means or other practically all of them arrived.

In planning the project the general procedure expected to be followed consisted, first, of the construction of camps at desired sites, including warehouses, shops, medical buildings and other necessary

structures. Next it was planned to sort and assemble the great amount of plant and gear of all kinds that was necessary, and finally, the major step to get construction under way. It was expected that the construction, in general, would consist of docks, railroads and highways, with necessary appurtenances, pipelines, and any other structures necessary to aid in getting material to Russia or required by our Allies in that area.

Actually, due to our entrance into the war, all three steps were carried out practically simultaneously, for men and equipment arrived slowly and the need for speedy construction became increasingly urgent. An interesting sidelight on this was the following incident. A large dock construction group was work-

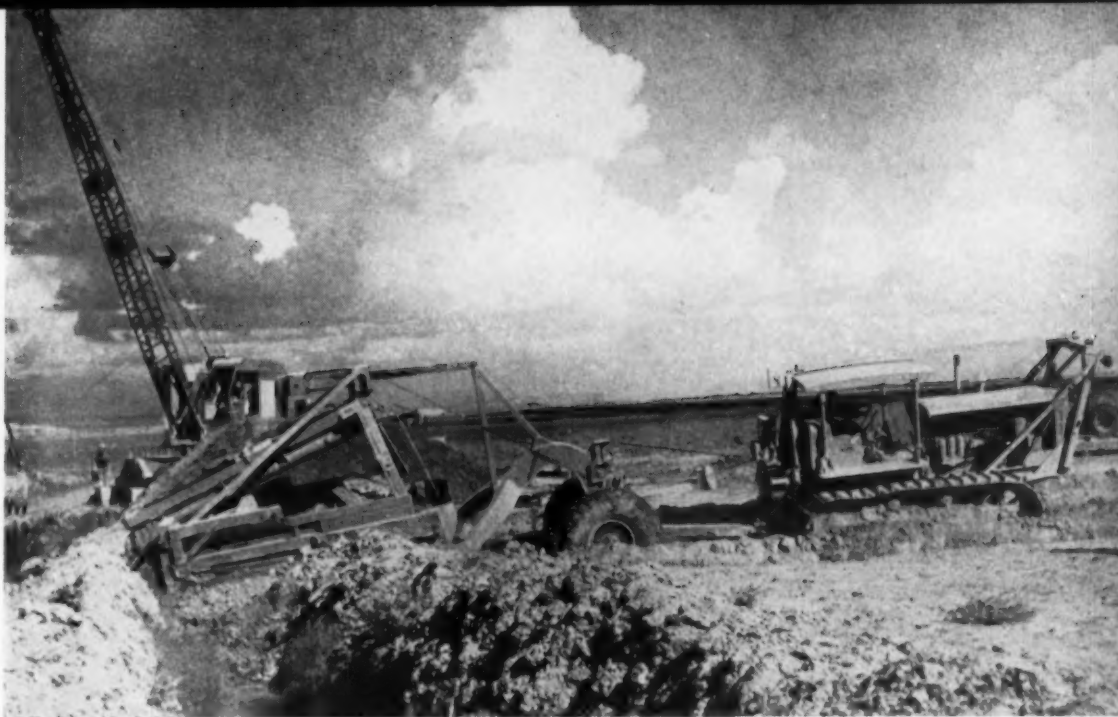
ing at Khurramshahr, in Iran, building docks to handle ships from England and the United States. One evening that infamous character, Lord Haw Haw, was picked up by radio broadcasting from Germany. One statement hit home with something of a shock when he said that it was a fact that the American forces were doing excellent work on the docks at Khurramshahr, and that Mr. Hitler would put them to good use when he visited the place within a few weeks—although he hasn't reached there yet.

Scope of Work

The work actually undertaken comprised the following: Camps were constructed. In most cases the camps were erected in a barren area, and included everything from shelter and sanitary facilities to a recreation room. The fact that the first equipment had to be assembled with the aid of blocking jacks and that all packing cases had to be salvaged as building material gives one an idea of the primitive facilities with which work was started.

Docks were constructed to provide facilities for ships. In conjunction with the docks, railroad approach trestles and truck approach trestles were also built.

Pre-fabricated barges were assembled for use of river traffic, an extremely important item in solving the local river transportation and lighterage problems. This project was accomplished at the principality of Kuwait, on the Persian Gulf. The ruling sheik, working by contract, turned the majority of his male subjects to this task, under the supervision of the American foremen. He and his associates also introduced many of



HIGHWAY FILL is placed by Caterpillar-Le Tourneau tractor-scraper unit and crane.



GANG OF NATIVES adzes teakwood and mahogany piling supplied by British. As these timbers were never more than 30 ft. in length, it was necessary to splice two, and in some cases three, together to make pile of sufficient length. It was necessary to size piling, as in some cases timbers were 30 in. in diameter, which was not only too large to be handled in piledriver leads, but also too heavy to use properly in bracing system.

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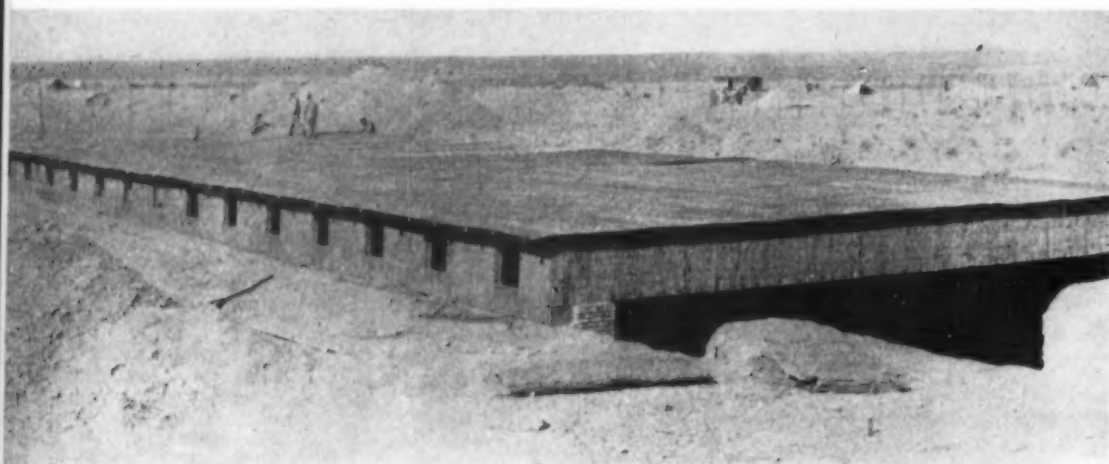
NATIVES NAIL DOWN SHELL (below) of wood barge hull. Labor for construction of these barges was furnished by male population of principality of Kuwait, adjacent to Arabia on Persian Gulf. Barges were preformed in America and assembled and launched on Persian Gulf for use of river traffic on Shat al Arab River.

WAREHOUSE WITH STEEL FRAME (below) is erected.





CORRUGATED METAL CULVERT is installed at critical point.



BELOW GROUND warehouse is constructed to conserve badly needed materials and hide structure from possible bombing raids.

EXCAVATION (below) for warehouse shown in photograph above is done with clamshell bucket on Link-Belt Speeder truck-crane.



our men to the novel sports of falcon hunting and gazelle shooting.

One of the major parts of the construction program carried out by the constructors was the installation of berths in the Shat al Arab River. This work was done using equipment assembled in America and materials obtained both from the eastern and western hemispheres. To supply the skilled labor, American forces were used, while the natives were depended on for such simple operations as they could be trained to handle. It was surprising to note the skill they developed because of their interest in this, to them, unusual work.

One of the most difficult factors of this work was adjusting the lumber sent from India and Australia to the type of construction desired. The piling from these areas—teakwood and mahogany—was dense and heavy in addition to being short in length and over-size in diameter. Because of these conditions, the cost of splicing, adzing and handling the finished piling was greater than the cost of driving the same. This was particularly noticeable after we had become accustomed to handling the Douglas fir piling and lumber sent from the States and used during the first half of the construction.

Building Desert Highway

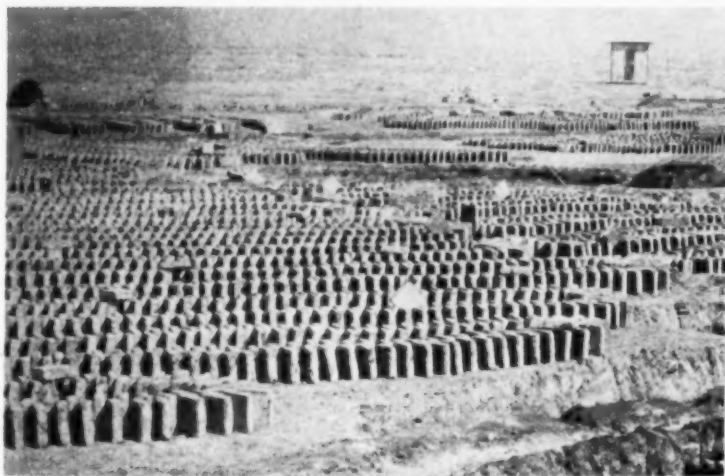
The largest project undertaken was the construction of a highway across the desert and foothills in southern Persia. This involved placing fill from 2 to 8 ft. above the desert floor, constructing bridges from 20 to 700 ft. in length, locating culverts at strategic points, placing a stone or gravel base and an asphalt or oil finish. The fill was placed by utilizing several methods, made necessary when a ship carrying a large amount of road construction equipment was sunk. The methods were as follows:

(1) Native contractors bid on sections about 6 mi. long. They utilized local "coolie" laborers, who carried the fill either in gunny sacks, by donkey, or, where available, by wheelbarrow, from borrow pits along either side of the new road. The workers were paid in several ways, either place measure, borrow pit measure, or by the day, depending on the availability of good men. The usual procedure was for a man to take a parcel 100 ft. long and, using his whole family, work as many hours as his strength would permit mostly in the cool of the night. The native contractor would supply reed mats for a lean-to at the site, and there would be the family's living quarters. The native contractor also supplied each worker a daily ration consisting of 1 1/4 lb. of flour, 2 oz. of sugar, and 1/3 oz. of tea, which he obtained from the American constructors. This food, supplemented with dates, rice and fish, made up the workers' daily menu. The turnover of labor was very high, particularly prior to the rainy season, as these people are of a nomadic race.

(2) A second means of placing fill was with two elevating graders, which had
(Continued on page 157)



MESS HALL serves construction men at one of many camps established in area. Depending on permanency of camp, these varied from tent with few facilities to well-equipped kitchen and dining room.



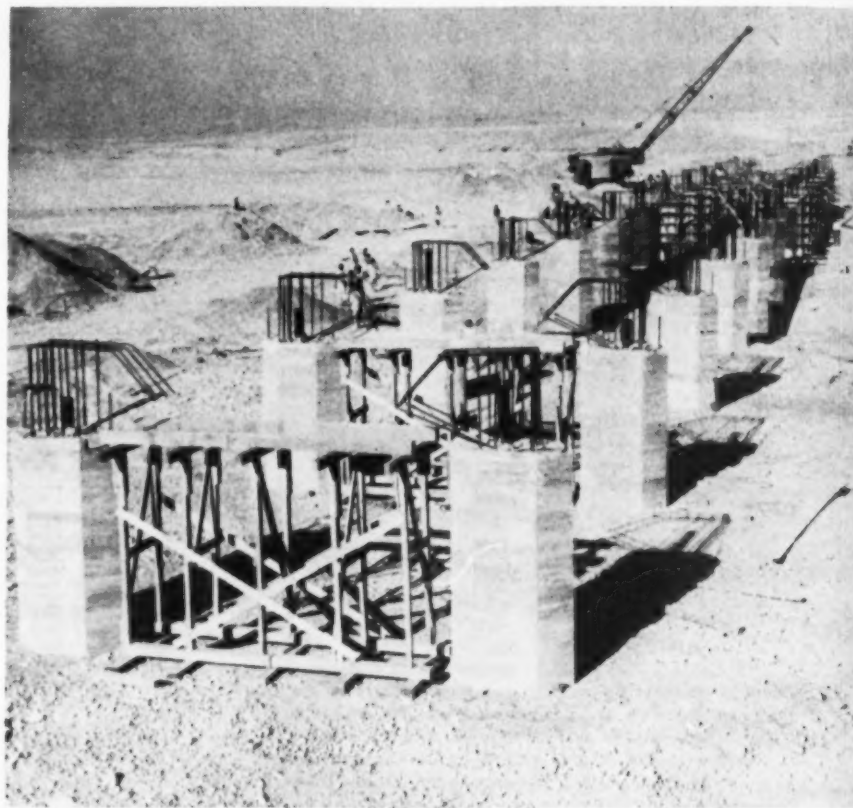
TWO METHODS are used exclusively in Iran for building houses. One is similar to our method of pouring concrete, except that mixture of mud and water is placed by hand to maximum height at which it would be stable. When this dries out sufficiently another section is erected on top. This continues until wall is built to sufficient height. This method is very slow and when quicker results are required, mud brick, as shown above, are manufactured, using clay found 15 in. below desert floor.

MAIN HEADQUARTERS (below) of contractors' organization. Structure had been started as hotel prior to occupation of Iran by British. It was taken over in its incomplete state by American forces and converted to satisfactory office and headquarters for contractors' key personnel.



GRAVEL IS EXCAVATED by P&H dragline at one of three sites found satisfactory in area.

CONCRETE PIERS (below) are erected to support deck of Paaswell Bridge. In rainy season this channel was almost filled to capacity.





CONCRETE PIPE DRAIN is laid in trench by truck crane while tractor-bulldozer in background spreads gravel backfill in rebuilding grade for pavement.



2-YD. SHOVEL loads glacial boulder till into trucks to be dumped in disposal area. Big shovels are needed for economical handling of boulder clay.

Army Airfield Job

Tests Contractor's Transport Service



VERSATILE TRACTOR, equipped with both pusher plate and single-tooth rooter, gives boost to 12-yd. scraper drawn by pneumatic-tired two-wheel tractor. Scraper is loading tough, abrasive boulder till, previously scarified with rooter. Scraper units, most of them pulled by crawler tractors, handled good part of airfield grading for pavement.

SELF-PROPELLED FINEGRADER (right), which draws itself forward by winding two hauling cables on winches, shapes subgrade of 25-ft. paving lane to proper transverse profile.



SERVICE OF SUPPLY is an important factor not only to an army but also to the constructors who build the establishments from which the army springs, as is illustrated by a large airfield project completed by the U. S. Engineers late in November at Stewart Field, near Newburgh, N. Y. On this job, the Mt. Vernon Contracting Corp., contractor, Mt. Vernon, N. Y., maintained a supply schedule which called for arrival of a truck at the field every 20 sec. to deliver gravel for base courses and aggregates, cement and water for concrete pavement. More than 250 trucks were in operation to haul these materials and another group of about 50 trucks and a fleet of carrier scrapers were in use on the field to dispose of the excavation for the base courses and the grading required to extend the east and west ends of the landing field.

In all, about 1,600,000 cu. yd. of material was excavated and nearly 800,000 cu.yd. of gravel base and sub-base courses was imported from outside borrow pits up to 9 mi. distant. In order to place 750,000 sq. yd. of non-reinforced concrete pavement, made with Vinsol resin cement to increase scale resistance, heavy diesel trucks of 12-yd. capacity hauled some 260,000 tons of aggregates



JOB MANAGEMENT for Mt. Vernon Contracting Corp. makes good use of these men: (Left to right) JACOB FELD, engineer consultant; JOSEPH M. GEARON, project manager; and ARTHUR PETRILLO, member of firm, in charge of equipment.



FLEXIBLE-SHAFT INTERNAL VIBRATOR, powered by portable plant mounted on finishing machine, consolidates concrete along edges of slab and adjacent to transverse expansion joint. Opening in concrete pavement at left is for catch basin in depressed gutter used in large paving area.

on an upgrade pull which climbed 400 ft. in 5½ mi. from a riverside loading wharf to the field. Two 34E dual-drum pavers, producing 36-cu.ft. batches on a 90-sec. mixing cycle for each batch, turned out as much as 850 cu.yd. per mixer in a 10-hr. day, sufficient to complete 1,750 lin.ft. of 25-ft. lane, 8-6-6-8-in. cross-section, on runways and a landing mat. This output was further in-

creased by a 27E paver which operated on taxiway connections and narrow lanes. Three batch plants on the job served the pavers.

Pavement Distribution—Two existing bituminous runways, 3,100 and 3,400 ft. long, were in continuous use throughout the execution of this contract and during the previous grading of the enlarged L-shaped 760-acre airfield by

three contractors, as described in *Construction Methods*, December 1942, p. 42. Existing runways and new runways on the landing field are uniform in width. The 3,400-ft. runway was lengthened to about 6,000 ft. by extensions at both ends, and the 3,100-ft. runway was increased in the same manner to about 5,300 ft. Two new runways were con-

(Continued on page 126)



USE OF VINSOL RESIN CEMENT in concrete causes weight reduction which is checked periodically by weighing 1/3-cu.ft. samples of fresh concrete in cylindrical containers on scale.



PREMOLDED FILLER for transverse contraction joint is made up in steel shield for installation in machine-cut slot, as indicated by workman placing strip of filler in steel shield at left.

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RUNWAY LIGHT (below) in asphaltic concrete shoulder at edge of pavement is protected by concrete fenders against damage by snow plows.

TWO-MAN FLOAT (below) worked back and forth across pavement irons out any longitudinal irregularities in surface. Boulders have been placed on previously paved lane to prevent trucks and truck cranes from using it.



Maintenance Methods

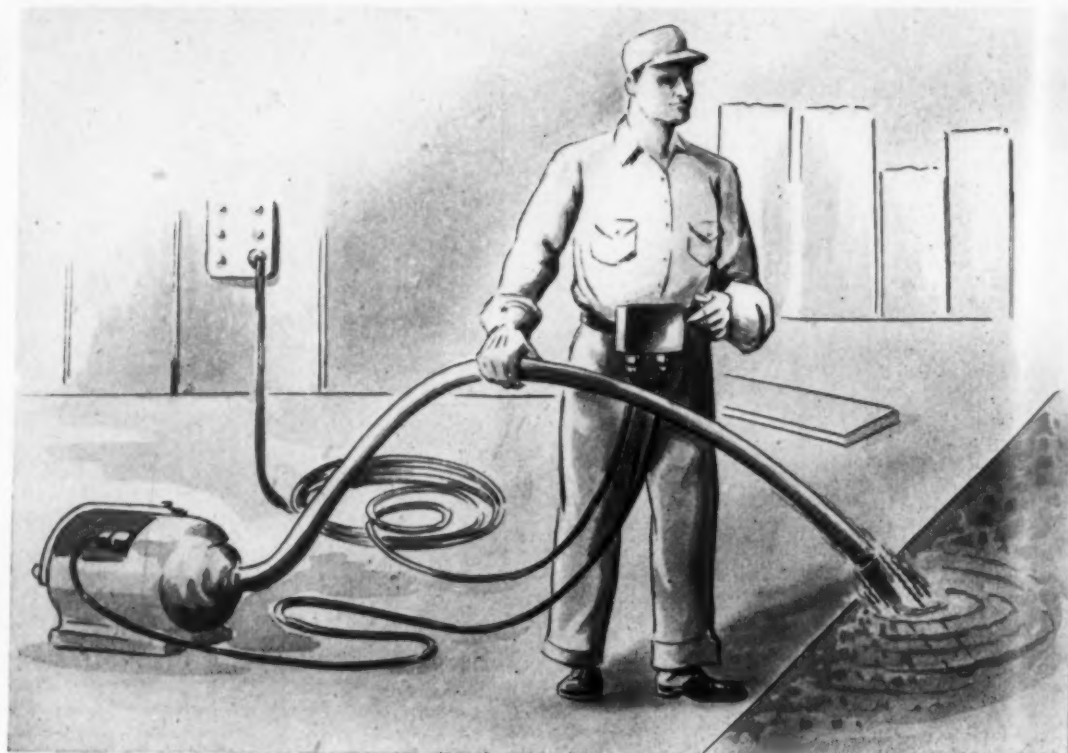
Prolong Life of

CONCRETE VIBRATORS

By R. F. HARRISON

Master Mechanic, Barrett & Hilp Co.

Belair Concrete Shipyard, South San Francisco, Calif.



SWITCH designed for attachment to belt of operator gives ease of control that eliminates need for assistant at motor, and reduces wasted operating time.

CONCRETE VIBRATORS are a very important item of construction equipment in the Belair Concrete Shipyard at South San Francisco, Calif., because without them it would be impossible to get proper placement in forms that have only the very limited clearances specified for modern concrete barges. In the hull walls, for example, which are 6 in. thick, there are two curtains of heavy reinforcing steel and utmost importance attaches to practically perfect placement, because there is only $\frac{3}{4}$ in. of concrete cover protecting steel from salt water attack. Because of the small clearances a special vibrator head was made with an over-all diameter of only $1\frac{3}{4}$ in., instead of the usual $2\frac{1}{2}$ - to 3-in. diameters.

Concrete pouring schedules at this yard, where the contract is for 26 barges of 10,500-ton capacity, call for simultaneous use of as many as 70 vibrators. For this important work Bar-

rett & Hilp, the contractors, standardized on a vibrator made by the Viber Co., the Model E121 unit, in which a $1\frac{3}{4}$ -hp. electric motor drives a 12-ft. flexible shaft terminating in the special, small-sized head. This vibrator operates at about 14,000 rpm. when running free—somewhat less when immersed in concrete. At this speed, lubrication and bearings need frequent and careful attention. To reduce risk of breakdowns during a pour, a maintenance shop was set up in the yard where a program of regular inspection and servicing can be carried out.

During each pour, concrete is placed continuously for 24 to 36 hr. During these pours the maintenance shop operates on a 12-hr. shift and each vibrator gets a complete inspection—and whatever maintenance or repair work is necessary—after 8 to 12 hr. of actual running time. If the pour is light, the vi-

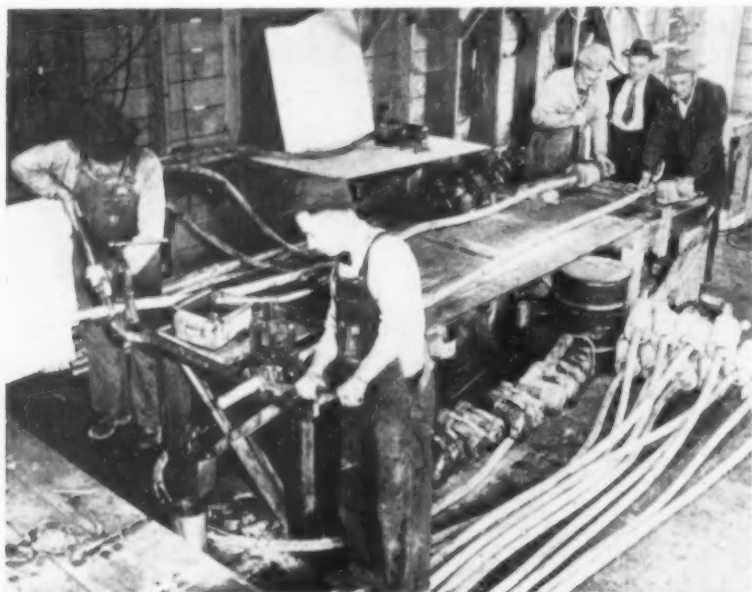


Fig. 1 . . . FOUR-MAN BENCH permits of simultaneous work on both ends of two 12-ft. vibrators and speeds up rush work.

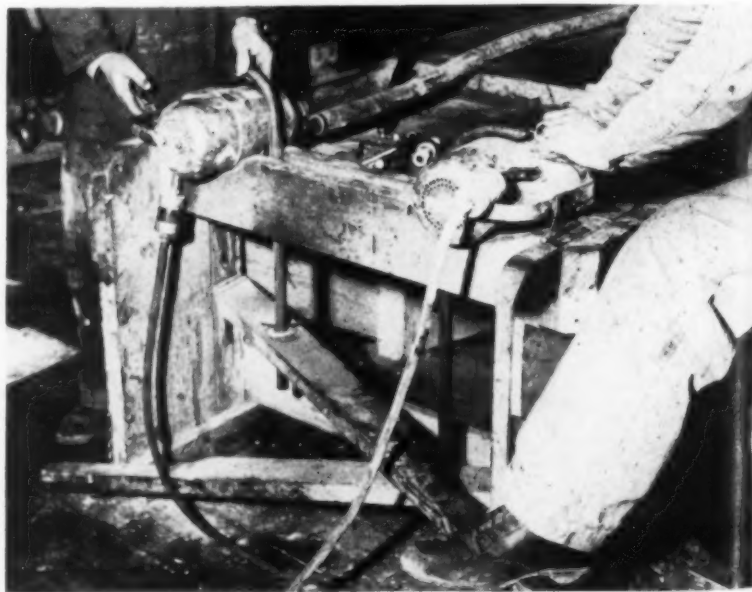


Fig. 2 . . . MOTOR END OF BENCH has quick-acting clamps for holding motor frames for disassembly, inspection and minor repairs.

brators may be allowed to run 12 hr., but on heavy work they come into the shop for servicing after 8 hr. This constant attention to maintenance has increased the life of vibrators many fold and has kept initial investments down by making it possible to operate successfully with only 14 percent of vibrator "spares" to take care of machines out of service for repair.

When the rush of a continuous pour is on, vibrators coming into the shop get simultaneous attention at both ends of the flexible shaft. A four-man bench (Fig. 1) is equipped for this service by having at one end a pair of clamps for the electrical motors and at the other end pipe vises with jaws made especially to fit the vibrator heads. Electric motor clamps (Fig. 2) have a hinge connection for the handle on the motor frame and a heavy steel hook that fits over the top of the motor and is clamped down by a foot-operated lever fitting into one of a series of notches in a steel locking bar. Motors get their inspection right here. While the frame is clamped, as described, brushes and brush holder assembly are examined and the rotor can be taken out if desirable to replace bearings, turn down the commutator or do other repair work.

Flexible Shaft Disconnected

The flexible shaft, meanwhile, is disconnected at both ends and is moved to another bench where the two most frequently needed operations, core lubrication and rubber vulcanizing, are performed. If the core is to be lubricated, usually after 8 to 12 hr. of operation or when the sound of rotation begins to be harsh, the core is withdrawn from the casing and, after being wiped free of old grease, is passed through the grease-filled hand of a workman who, from time to time during the process, takes a new handful of grease. Greasing the core in this way distributes the lubricant uniformly and the casing is not overfilled, as might be the case with forced, under-pressure injection of grease. If too much grease is forced into the shaft casing there is a tendency to churn the lubricant, using up energy and causing the casing to heat and wear. The lubricant is selected for its tendency to cling to the core instead of to be thrown off by centrifugal force.

Rubber Casing Repaired

At this shipyard the greatest wear on flexible shafts is near the vibrator, where the maximum bending occurs. Wear at the motor end is a minimum. Rubber covering is frequently worn through, near the vibrator, and casings would soon have to be discarded if they were not repaired. An electrical vulcanizing unit (Fig. 3), designed in the shop, was built to facilitate replacement of worn rubber coating on the casing. This vulcanizing unit is in two halves, hinged, so that the heating elements can be clamped around the casing. When worn rubber has been replaced, the protection on the casing is equal to the original. Vulcanizing can be done again and again; six times is normal life. After about six renewals at the vibrator end, the casing is turned end for end. That is, special couplings adapt the motor end for attachment to the vibrator, and vice versa. This plan again multiplies service life by six.

When new bearings are put into a motor, the rotor is put into a lathe set-up (Fig. 5) arranged so the end of the shaft opposite the commutator will be rotated by the chuck while the commutator rotates on the new roller bearing that will be used in the motor. Thus, a cutting tool can be used to true the commutator with respect to the new bearing itself, giving a more accurate job than if rotation while in the lathe were about a lathe spindle set against the dead center of the shaft carrying the bearing.

The vibrator head, 10 $\frac{3}{4}$ in. long, on the outer end of the flexible shaft, has two ball bearings of the open-race type, running in oil. These are single-row, radial bearings in which a splash system oil bath is used. These bearings are expected to give a life of a certain number of hours, although if the sound of rotation takes on a warning tone they are replaced

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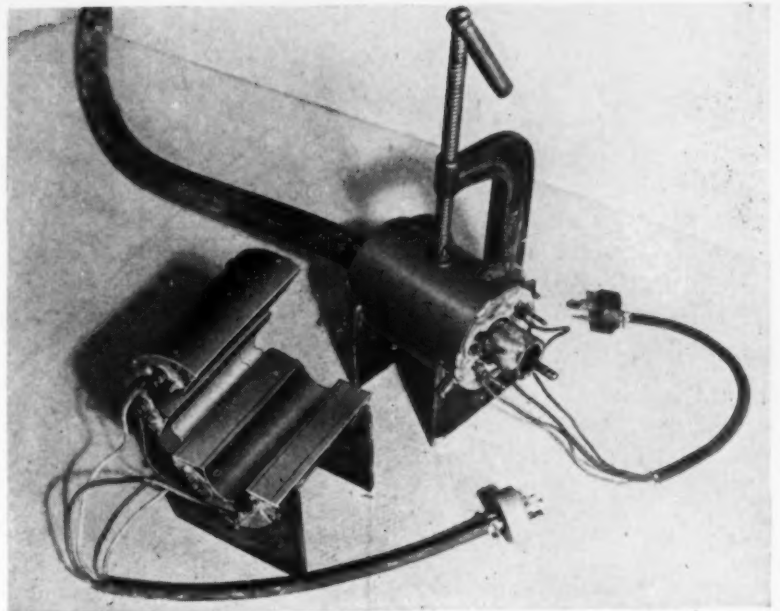


Fig. 3 . . . ELECTRIC VULCANIZER, expressly made with two hinged parts, repairs rubber on casing where greatest wear occurs.

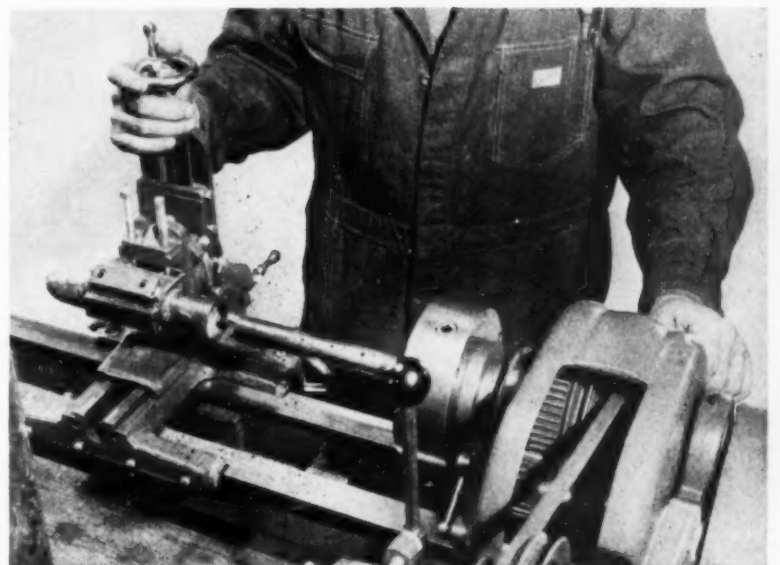


Fig. 4 . . . VIBRATOR HOUSING is set up in lathe for reborer, after replacing worn metal with an external layer of stellite, welded on. Housing at left; cutting tool at right.

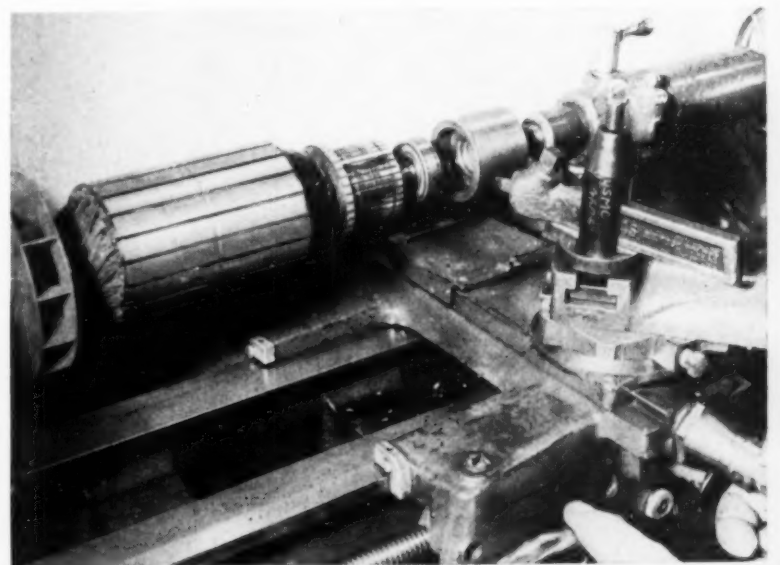


Fig. 5 . . . COMMUTATOR IS TRUED in a lathe set-up that uses as center rotor bearing, instead of shaft center.

Engineers in War

PERFORM MANIFOLD TASKS WITH

HEAVY-DUTY CONSTRUCTION EQUIPMENT



By

MAJOR GENERAL EUGENE REYBOLD

Chief of Engineers, U. S. Army

IN DISCUSSING ENGINEER EQUIPMENT in theaters of operations—in particular the South and Southwest Pacific, from which I have recently returned—we must first clearly understand the diversified tasks which constitute the Engineer's mission. This mission we must then fit against the tremendous time-consuming distances that exist in the Pacific, and the geological and physical conditions with which we are confronted out there. Only then can one begin to appreciate the magnitude of the job that exists and lies ahead for Engineers and Engineer equipment.

Immediately after Pearl Harbor, it was up to the Engineers to pioneer the air lanes to the South Pacific, an island-hopping construction job extending half-way around the world. Landing strips and landing fields, scores of them, had to be built, and we are still building. Supply roads—whether they connect the "end-of-rail" in Canada with an Alaskan base of operations as in the case of the Alaska Highway or whether they are mucked through the South Sea jungles, or bulldozed over the hot African sands—constitute a prime mission. The ever-advancing fighter and bomber fields simply mean a repetition of more of the same.

Airport operations mean petroleum distribution and this in turn means the location, construction, operation and maintenance of military pipelines for supply of fuel in theaters of operations. Moreover, water must also be found, purified and distributed to all units. The countless airfields must be built in short time under the toughest of conditions.

Engineers' Varied Duties

Engineer troops serve with Air Forces, Ground Forces and Army Service Forces. Combat battalions serve with infantry divisions, airborne divisions and armored divisions. Engineer work is performed by

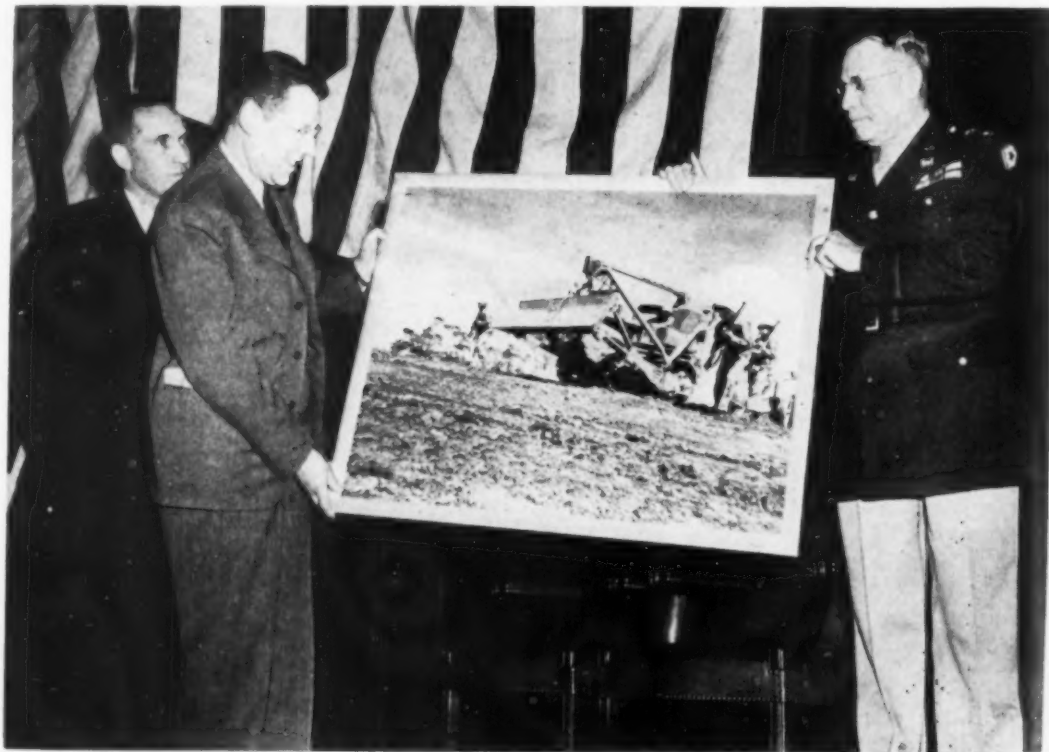
general service regiments, aviation engineer battalions, water supply battalions, topographic units, ponton units, camouflage units, maintenance and bridge units, depot units and amphibious units. Supply units, trained for the performance of special technical Engineer tasks, include port construction and repair groups, fire-fighting battalions, utilities detachments, gas-generating units, and forestry battalions.

The mission of the amphibious Engineer is to transport combat units on to beaches in the assaults, evacuate wound-

ed, handle prisoners, salvage equipment and supply combat troops. Our combat forces having once gained a beach head, the Amphibious Engineer units join hands with other Engineer units in the establishment of road communications and in the development of unloading and distributing points.

Then we must supply shelter as well as certain utilities and incidental installations. So rapid had been our advance and so tremendous the job in the South and Southwest Pacific, that fixed shelter is either non-existent or in a very primitive condition. In most cases tents and tarpaulins must suffice. At advance bases supplying the various fronts in these theaters, there are no such things as warehouses and storage facilities or depots. Supplies are piled on the ground—that is all that can be done until the Engineers build the necessary shelters. The Engineer's task is *never* done, nor will it be until this war is victoriously ended. To illustrate: One Engineer general service regiment I encountered in the Pacific pushed its way through the wilderness which is now the Alaska

After General Reybold returned recently from a 30,000-mile trip to theaters of operations in the South and Southwest Pacific, he told members of the National Conference of Business Paper Editors the accompanying story of the important role Army Engineers and their equipment are playing in the war.—Editor



MAJOR GENERAL EUGENE REYBOLD, Chief of Engineers, U. S. Army, during visit to inspect manufacture of earth-moving equipment at plants of Caterpillar Tractor Co. and R. G. LeTourneau, Inc., Peoria, Ill., accepts from L. B. Neumiller, Caterpillar's president, standing in front of James R. Munro, factory manager, photograph showing armed body guard with armored bulldozer of Engineer combat regiment at Munda airfield.

Highway, then built offensive installations clear out to the end of the Aleutians and finally sailed to the Southwest Pacific to tackle jobs out there.

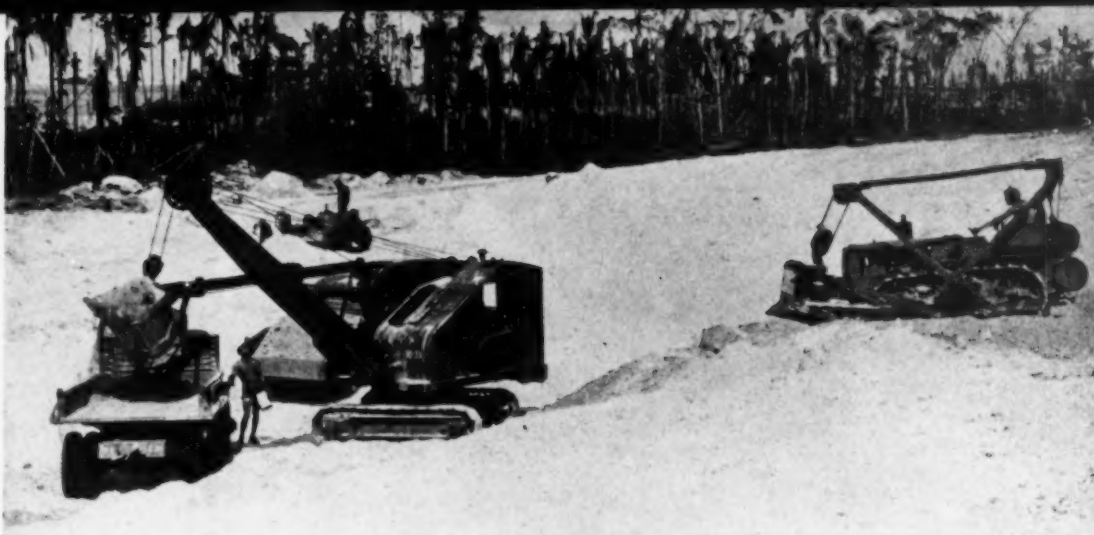
I think General MacArthur summed up the situation during our conference on this last trip when he said: "Reybold, this is an air and amphibious war; because of the nature of air and amphibious operations, it is distinctly an Engineer's war. Never before have Engineers played such an important role."

Whether the operations again a Jap-held base or island are amphibious or airborne—there is the jungle. The Japanese strategy has been to infiltrate into the jungle, carrying the lightest possible equipment, dig himself in and prepare to hold his position. He was taught that no similar tactics could dislodge him—a logical conclusion. But he was led to believe that heavy equipment to build continuously advancing airfields and roads for artillery could never be brought to bear against him. In that, he made the same error as his leaders when they proposed to dictate the terms of peace in the White House.

Heavy-Duty Equipment Needed

The kind of operations I have described necessitate heavy construction equipment and all we can get. Not only must all of this be manufactured in the United States and be transported to the Pacific bases, but it must be shared with all of our Allies around the globe whom we are supplying. Even though we are procuring and distributing practically the total output of this class of equipment, there is still not enough of it to go around.

Foremost among the items of heavy equipment is the bulldozer. This is the all-round favorite because it does more things well than any other machine and



FOR AIRSTRIP SURFACING on New Georgia Island, coral pit near Laiana is worked by bulldozer and crawler shovel loading material into truck.

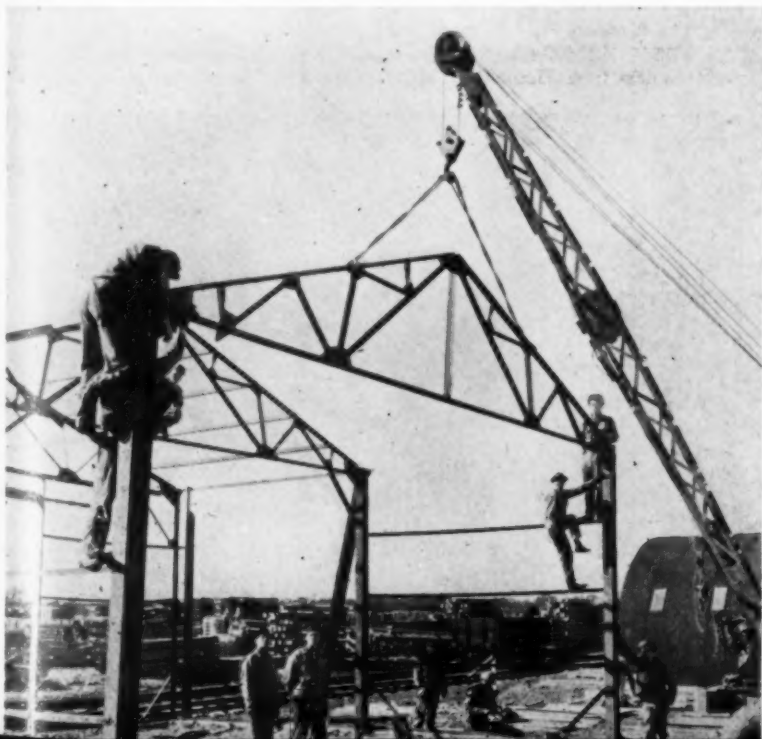
Official Photos, Corps of Engineers, U.S.A.



WORKING NIGHT AND DAY American paving mixer rushes construction of concrete-paved runways for bomber airdrome in England.

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STEEL ROOF TRUSSES (below) for storage at Army depot in England are erected by Engineer troops with aid of truck-crane.



JUNGLE BRIDGE-BUILDING (below) is beset with difficulties even on a jeep trail through dense tropical growth.





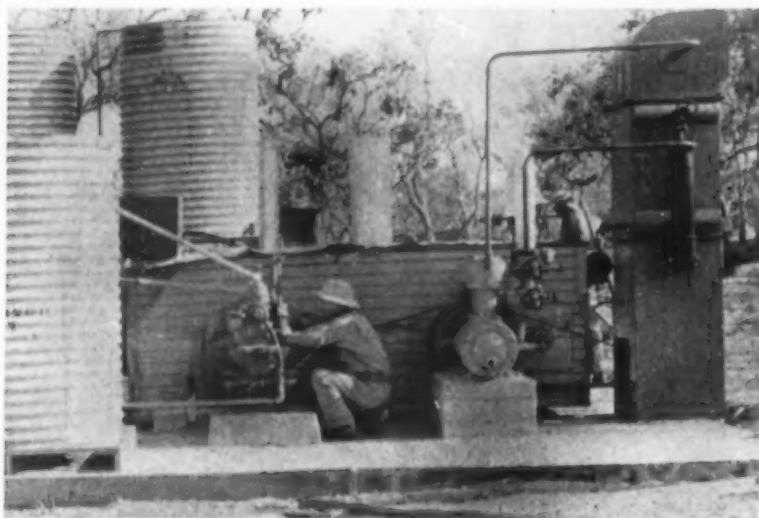
LOADING PIER in Algeria, North Africa, is built with aid of bulldozers and tractor-operated LeTourneau crane mounted on pneumatic-tired wheels.



POWER-OPERATED CHAIN SAW cuts timber for trestle bridge after invasion of Italy by Allied forces.



TRACTOR-HAULED SCRAPERS operated by Army Engineers grade landing and takeoff strip for heavy bomber planes at Espiritu Santo.



ICE-MAKING PLANT (left) is installed by U. S. Army Engineers in northern Australia.

it is even difficult for Japanese pillboxes and machine gun emplacements to stop it.

Heavy bulldozers are vitally necessary. Shovels, draglines, cranes, piledrivers, well-drilling rigs, pumps, dump trucks, rollers, graders, rock crushers, and paving machinery are also necessary for specialized work. To fulfill the Engineer's mission of water supply for kitchens and drinking purposes, we must have purification units sufficiently mobile to keep up with the advancing troops.

American Engineers and manufacturers have developed and perfected small models of the essential earth-moving equipment in order that it may be carried forward rapidly by air to perform initial work in the building of advance air strips. Furnishing and placing of steel landing mat by the Engineers is of utmost importance in air operations. As time permits, it is replaced by asphalt or concrete.

And all of this equipment must be kept in good running order. Hence, we have specialized maintenance and shop units, as well as depot units from which spare parts must flow to the right place at the

(Continued on page 108)

FAR FROM HOME, this Buckeye crane (below) has made long land and overseas trip from Findlay, Ohio, to operate at Milne Bay, New Guinea.



ENGINEER CRAWLER CRANE (left) is converted into piledriver by equipping it with leads to help build loading pier in Algeria, North Africa.

LEGAL ADVENTURES

of TRACTOR CONN



By LESLIE JOBB

No contractor ever tries to be his own dentist or his own shoemaker. It is even more dangerous for him to be his own lawyer. There are, however, some legal rules which every contractor should know, and these rules may be explained in plain English without resorting to the jargon of the law, unintelligible to most laymen.

This series of articles, dealing with the Legal Adventures of Tractor Conn, a typical contractor anywhere in the United States, explains some of these legal points in plain language for the contractor. Each one is based on an actual decision of an American Court.

The Case of the Unexpected Fire



"You're sure you can deliver this lumber according to contract?" Tractor Conn queried, wondering about wartime shortages and that sort of thing.

"Absolutely," the salesman assured him. "Our mill's running full time, and we keep right up with

our orders."

"Good enough," said Conn.

The seller did not deliver, however, as his mill burned down a few days later, and Conn demanded delivery according to the terms of the contract.

"I'm not bound to deliver when the mill that I was depending on to fill your order has been wiped out of existence," the seller contended.

"You took the risk of that when you signed the contract," Conn replied, "and you've no more right to cancel it than I'd have if all my equipment had been destroyed."

The United States Supreme Court ruled in his favor; and there are Illinois, New York and Vermont rulings to the same effect. Of course, if the contract of sale had contained a stipulation that the seller would have been relieved from liability under these circumstances, Tractor Conn could not have collected damages for the failure to deliver.

The Case of the Unregistered Letter

"One thing more," the construction salesman added. "Here is something on our order blanks I must read you: 'Any defects in or objection to the quality of the supplies specified in this order must be communicated to the seller by registered mail within 30 days after the receipt thereof.' The shipment arrived, turned out to be defective, and Tractor Conn immedi-

ately wrote to the manufacturer to that effect.

"Be sure to register that letter," Conn ordered his secretary. She took the letter to the postoffice, found the registry window closed, the "boy friend in khaki" and the inevitable invitation to an afternoon show at the neighborhood theater, and this combination produced the usual result. She dumped the letter in the ordinary mail, and departed with the boy friend for the show aforesaid.

The manufacturer received the letter, however, and admitted that he did, but refused to remedy the defects complained of.

"You were bound to notify me in exactly the method prescribed by the order," was his contention. Conn maintained that the method was immaterial, so long as the notice was delivered—and the North Carolina Supreme Court ruled in his favor in 144 N.C. 307.



The Case of the Accepted Bid



"I am bidding on the Ajax Building contract. Find inclosed specifications and list of my requirements. Kindly quote me your lowest prices," Tractor Conn wrote his supplier.

"Inclose quotations and wish you luck," the supplier replied, and

Conn promptly submitted a bid on the basis of those quotations.

"Owing to the general uncertainty in the building field, am forced to withdraw my last quotations," the supplier wrote three days later.

"I bid on the strength of your quotations, and my bid has been accepted. I intend to hold you to your offer which you couldn't withdraw when you knew I was bidding on the strength of it," Tractor Conn shot back, sued for damages, and lost.

Said the Court, in deciding in the supplier's favor:

"In this case the supplier offered to deliver the building requirements in return for Conn's acceptance, not for his bid, which was a matter of indifference to the supplier. That offer (to deliver) could become a promise to deliver only when the equivalent was received: That is when Conn promised to take and pay for the supplies. There is no room in such a situation for the doctrine of 'promissory estoppel'."

The Case of the Telegraphic Check

"Your account for \$5,000 is long past due, and suit will be entered unless I receive a satisfactory reply by wire," Tractor Conn's telegram read.

This telegram had the desired effect, as the customer had a checking account with a bank in Conn's home town and promptly wired the bank to pay to Conn or order the sum of \$5,000, and sent a duplicate of the telegram to Conn, which he promptly presented to the bank and demanded payment.

"What gave you the idea that we'd pay cash on a document like that?" the teller demanded.

"Because it's a check," Tractor Conn assured him.

"Well, if that's a check it's certainly in a new dress," the teller said.

"Isn't it dated?" Conn demanded.

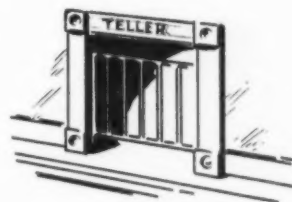
"It certainly is."

"And directed to your bank?"

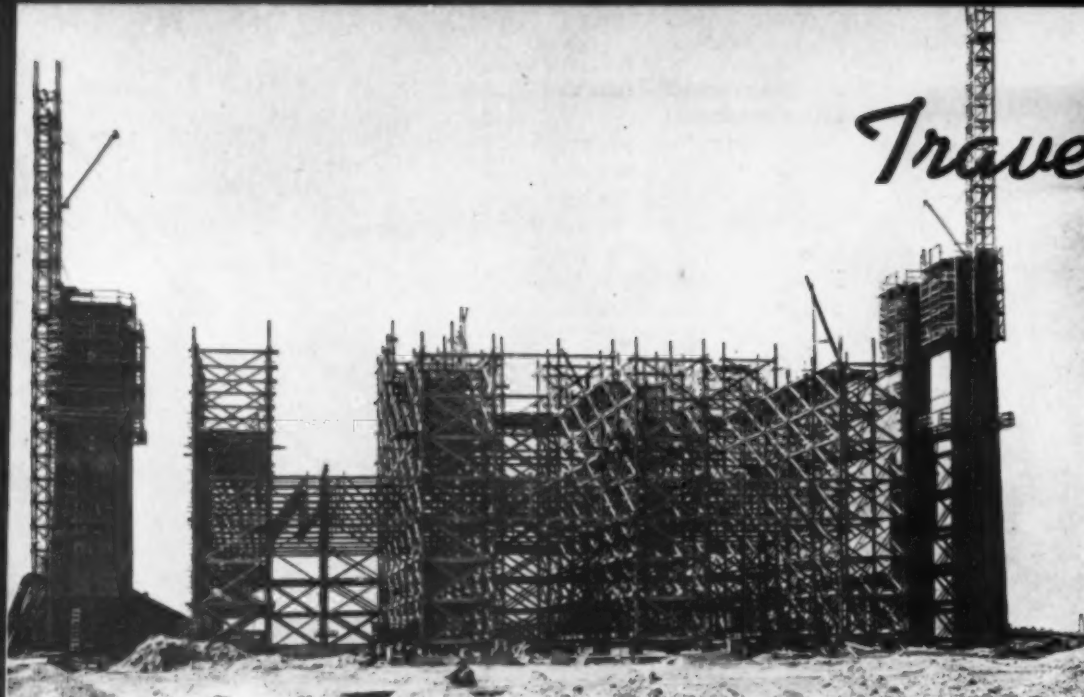
"Certainly."

"And directs you to pay a certain sum of money?"

(Continued on page 104)

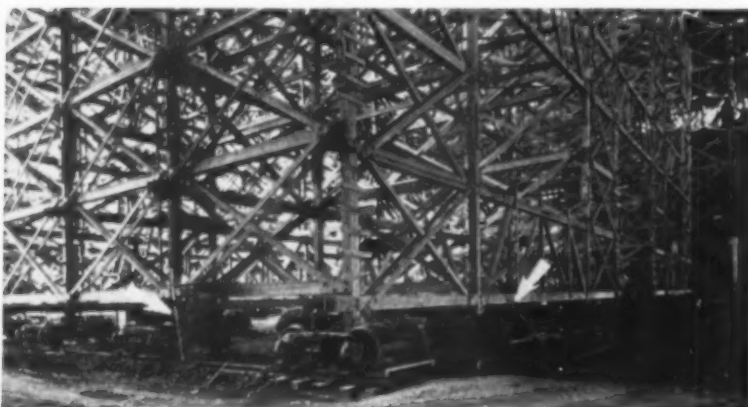


Traveling Scaffolds



PREPARATORY TO ERECTING huge timber arch hangar 1,000 ft. long and 170 ft. high for Navy coastal patrol blimps, contractor at Gulf Coast station constructs staunch traveling scaffold designed to withstand 100-mph. winds. Continuous tower framing being erected across far end of scaffold is to support four erection derricks; four tower wings extending rearward between door pylons in foreground will provide support for hangar arches during erection.

Part 1 of these articles appeared in January 1944, p. 56



85 RAILROAD CAR TRUCKS (left), one under each post of traveling scaffold, support timber structure containing 670,000 b. ft. of lumber framed with bolted connections incorporating nearly 70,000 timber connectors. Turnbuckle tie-downs, two of which are indicated by arrows, and wedges and diagonal braces to cross-ties hold traveling scaffold in fixed position between moves.

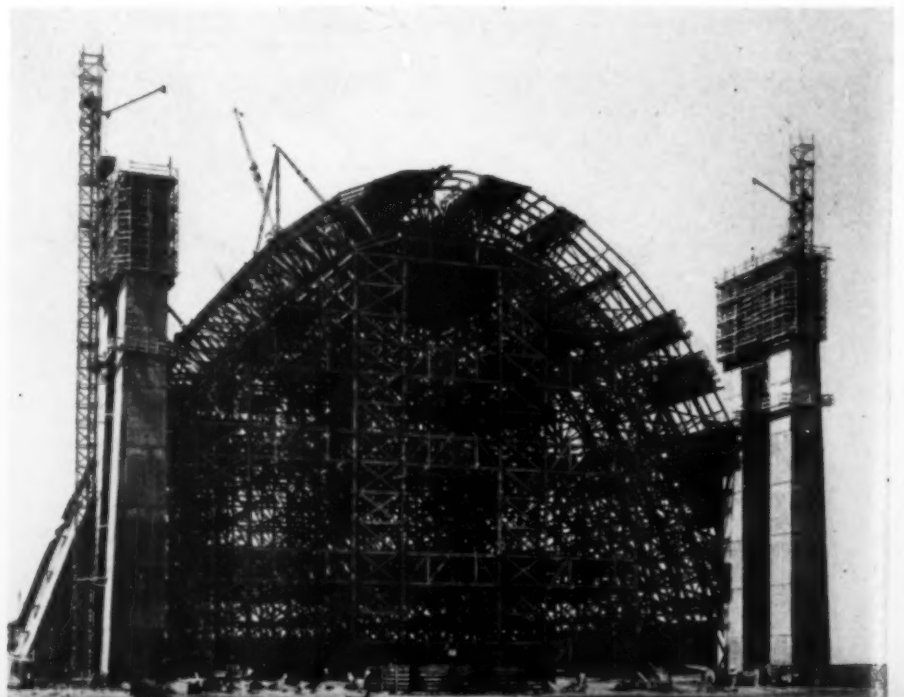
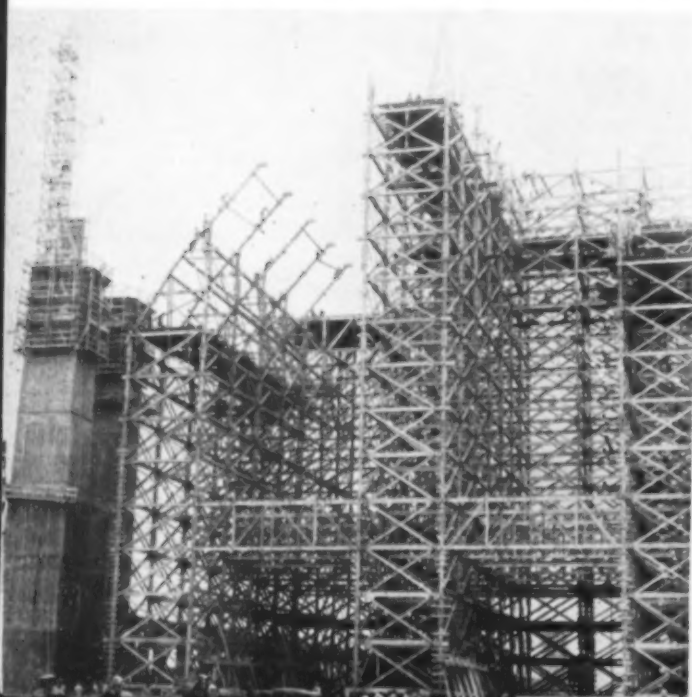
IN DETERMINING THE ERECTION SCHEME for a timber arch hangar to house coastal patrol blimps at the Hitchcock, Tex., Naval Air Station, two critical conditions, in addition to the usual construction problems, faced the Bureau of Yards and Docks and its three joint contractors, Norgaard & Shaw, Vilbig Bros., Inc. and Nathan Wohlfeld, of Dallas, Tex. Because erection had to proceed during the hurricane season, it was essential that both the temporary falsework and the erected portion of the permanent structure be safe at all times against winds of about 100 mph. As a second consideration, a severe labor shortage plainly presaged extreme difficulty in obtaining a sufficient number of agile men to work on construction of a hangar rising more than 170 ft. above the ground. To meet these conditions, a decision was made to build a large traveling scaffold to the full height and width of the opening under the arches. Such a scaffold would assist in anchoring the arches during a hurricane and would encourage a feeling of security among men working at the high elevations necessary.

That the solution was effective may be judged from the results. On July 27 and 28, when the hangar was half completed, with 24 arches erected and 22 bays completely sheathed, a hurricane of wind velocity estimated to exceed 100 mph. struck the job and passed on without leaving evidence of any deformation in the structure. As for speed of construction, after the first two 20-ft. bays had

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TRANSVERSE TOP MEMBERS (below) connecting tower wings are erected within clearance limits of hangar arches, which will be supported during erection on this portion of traveling scaffold. Continuous-frame portion of scaffold, from which tower wings project, already has been completed to 114-ft. elevation at side, and central section is being continued upward to 174-ft. height.

WITH TRAVELER IN INITIAL POSITION (below), erectors complete first three arches and reinforce two erected bays to form self-supporting unit and assure beam action under wind load. Before releasing scaffold, erectors set two guyed vertical steel masts (not shown) between door pylons at about quarter points of arch and anchor erected arch structure to these masts. Door pockets between concrete towers provide space for sequential steel doors in open position.

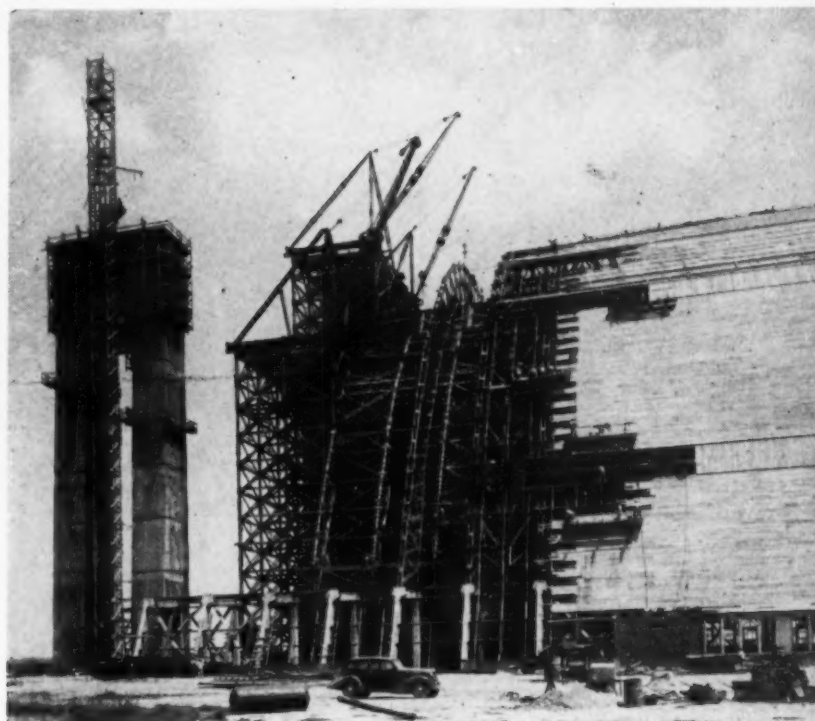


ERECT HUGE TIMBER BLIMP HANGARS... Part 2

Wood Jumbo Withstands Gulf Hurricane

By MADISON NICHOLS
Lieutenant Commander (CEC) V (S) USNR
Officer in Charge of Construction
U. S. Naval Air Station, Hitchcock, Tex.

FOUR STIFF-LEG DERRICKS (right) on traveling scaffold, two at 174-ft. level and two at outer corners on 114-ft. level, erect four truss sections to form one complete arch. Timber arch trusses spring from rigid-frame reinforced-concrete bents 24 ft. high. At each position of traveler, derricks erect two arches and place all diagonal bracing and roof purlins before unit moves to next location. Roof sheathing follows closely behind arch erection to stiffen structure against winds.



been braced, sheathed and anchored at the starting end of the hangar, the traveling scaffold enabled the contractors, despite the manpower shortage, to complete the remaining 48 bays at an average pace of $1\frac{1}{2}$ bays per working day. This progress included erection of arches, bracing, roof framing, sheathing and accessories.

Traveling Scaffold

Constructed entirely of wood, except for a few steel beams placed under stiff-leg erection derricks on the top, the traveling scaffold was 226½ ft. wide, 136 ft. long, and 174 ft. high at its maximum elevation. The entire assembly was mounted on 85 railroad car trucks of 20,000-lb. capacity traveling on eleven parallel lines of track.

Structurally, the scaffold was a tower

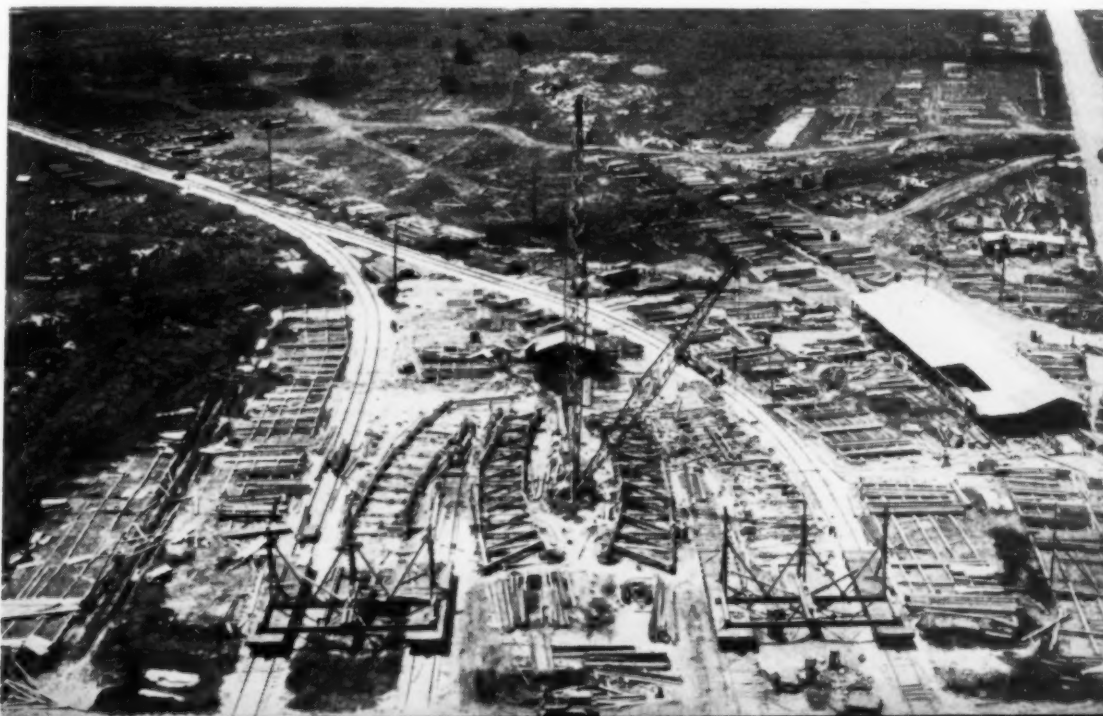


MOUNTED IN VERTICAL POSITION on special carrier frame on pairs of flat cars, four arch sections (two on each carrier) are ready to move ahead into position to be picked up by derricks on scaffold.

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DIAGONAL BRACING, made up in sections at fabricating yard, is raised from railroad cars and placed between arches by scaffold derricks.

FABRICATING YARD (below) near end of hangar makes up assemblies of timber members, accurately precut and prebored, for arch truss sections. Guy derrick in center of yard picks up assembled sections and loads them on to carrier frames supported by pairs of parallel railroad flat cars.

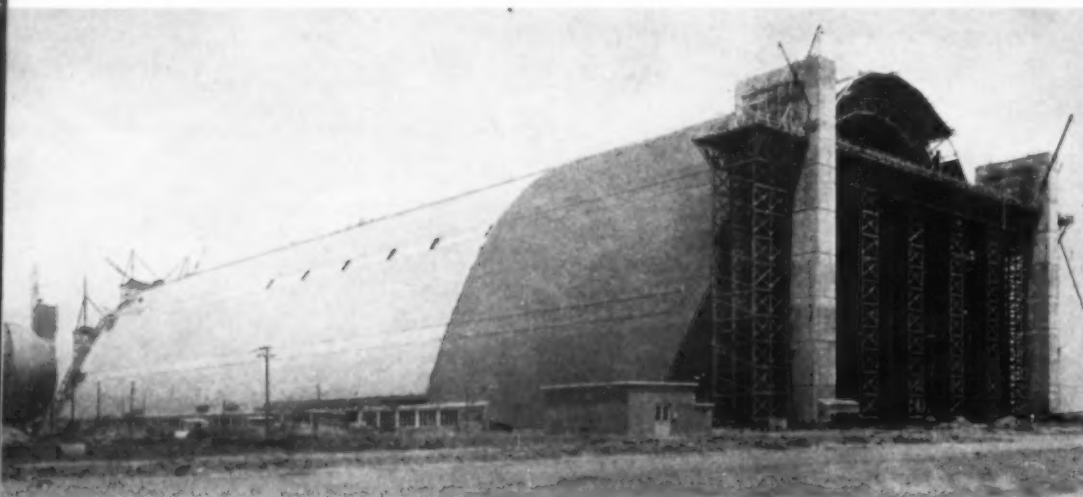




ROOF SHEATHING is placed by erection derricks in convenient position for handling by carpenters. Sheathing here is being applied on first three arches to stiffen initial arch unit before scaffold moves to next position. Steel masts to anchor end of structure have not yet been set.



HANGAR FOUNDATIONS are spread footings placed in excavations dewatered by well-points. Footings rest in clay overlying stratum of fine sand. Design bearing value of footings is 2,500 to 3,500 lb. per sq. ft., depending on location in hangar area.



HUGE TIMBER HANGAR 1,000 ft. long, with inside clear opening 237 ft. wide and 157 ft. high, approaches completion as traveling scaffold, partly visible at far end, erects timber arches and handles all materials for average progress of $1\frac{1}{2}$ bays per day. Special falsework towers have been erected at near end of hangar to support timber box girder, construction of which was delayed.

frame unit ten bays wide and seven bays long. The two forward bays, each 18 ft. long, which supported the erection derricks, consisted of continuous tower framing across the full 10-bay (226½-ft.) width of scaffold. Extending rearward from this 36x226-ft. portion were four wings of continuous tower framing, each wing being one bay wide and five bays (100 ft.) long. The tower wings were braced and tied laterally to one another at several levels by truss framing between the wings and were topped out to a profile which cleared the underside of the hangar arches. During hangar erection, the tower wings supported the hangar arches as they were erected and braced. The fully framed forward portion of the scaffold carried two outer derricks on side platforms at the 114-ft. level and two top derricks on a central platform at the 174-ft. level. Side der-

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FALSEWORK TOWERS (below) are used at this end of hangar for erection of timber box girder over door opening. Lumber for girder was not available when traveling scaffold was in this position.

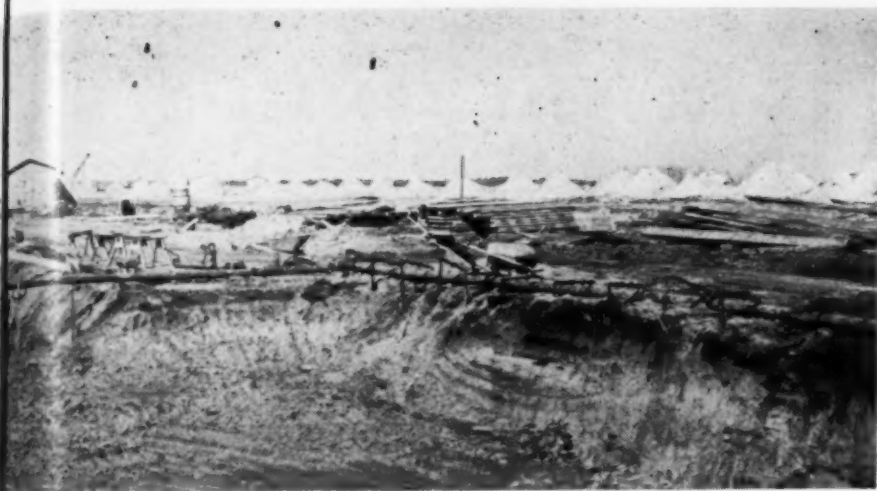
HIGH IN AIR (below) carpenters erect transverse top members connecting tower frames of scaffolding.



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WITH TRAVELING SCAFFOLD (right) in position to support main box girder, and steel frames of segmental sliding doors available to carry cantilever ends, erectors complete this girder in about half the time required for construction of similar girder on special falsework at other end of hangar. Steel doors also are erected by derricks on traveling jumbo.

ricks were wooden stiff-legs with steel booms 65 ft. long, and top derricks were all-steel stiff-legs with 65-ft. booms. All four derricks were rated 20-ton capacity.

As designed and constructed, the traveling scaffold was self-supporting against a 50-lb. wind pressure without guying. Lumber in the scaffold was dense Southern pine with an allowable safe fiber stress of 1,200 psi. Posts were 12x12 and 10x10-in. timbers anchored to the railroad trucks by special steel shoes fabricated for the purpose. All scaffold frame connections were bolted, with timber connectors to develop shear resistance. The connections required 19,000 $\frac{3}{4}$ -in. bolts and nearly 70,000 Teco connectors: about 43,000 4-in. split rings, 22,000 2 $\frac{1}{2}$ -in. split rings, and 4,000 4-in. shear plates.

To move the traveler from one position to another, two small tractors were connected to the scaffold by cable bridles which distributed the load across the width of the structure. Between moves, the scaffold was anchored to the railroad tracks by short tiedown cables equipped with turnbuckles, and the car trucks were fixed against movement by wooden wedges which were nailed to diagonal braces from the wheels to the crossies.

Erection Procedure

Erection of the 1,000-ft.-long hangar involved two distinct conditions. During the initial stage of construction, the first few arches to be erected and sheathed had to be anchored to make them self-supporting against high wind pressures after the traveling scaffold had moved clear. Until they had been completed, the first three arches were guyed and braced to the scaffold. The work on these arches included the installation of bracing, sheathing and additional reinforcing to assure beam action in the initial two-bay arch unit. Additional reinforcement placed between the arch trusses in the first two bays consisted of turnbuckle tierod diagonal tension members and



8x8-in. timber struts designed to develop beam strength in the framed structural unit.

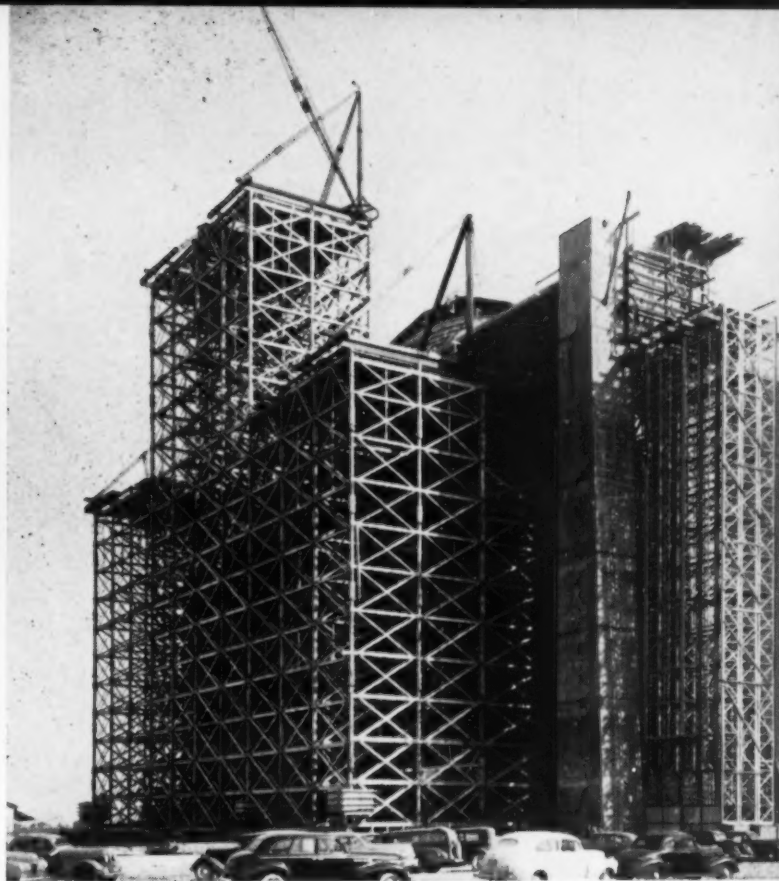
After the three arches had been reinforced to function as a beam, they were further secured against movement by being anchored to two 150-ft. steel masts erected in vertical position on the ground at about the quarter points of the first arch. These steel masts were guyed in all directions, and the framed three-arch unit was snubbed securely to them. Thus reinforced and anchored, the archwork was in a self-supporting condition to permit the release of the falsework.

Once the first stage of hangar construction had been completed as described, the remaining arches could be erected and

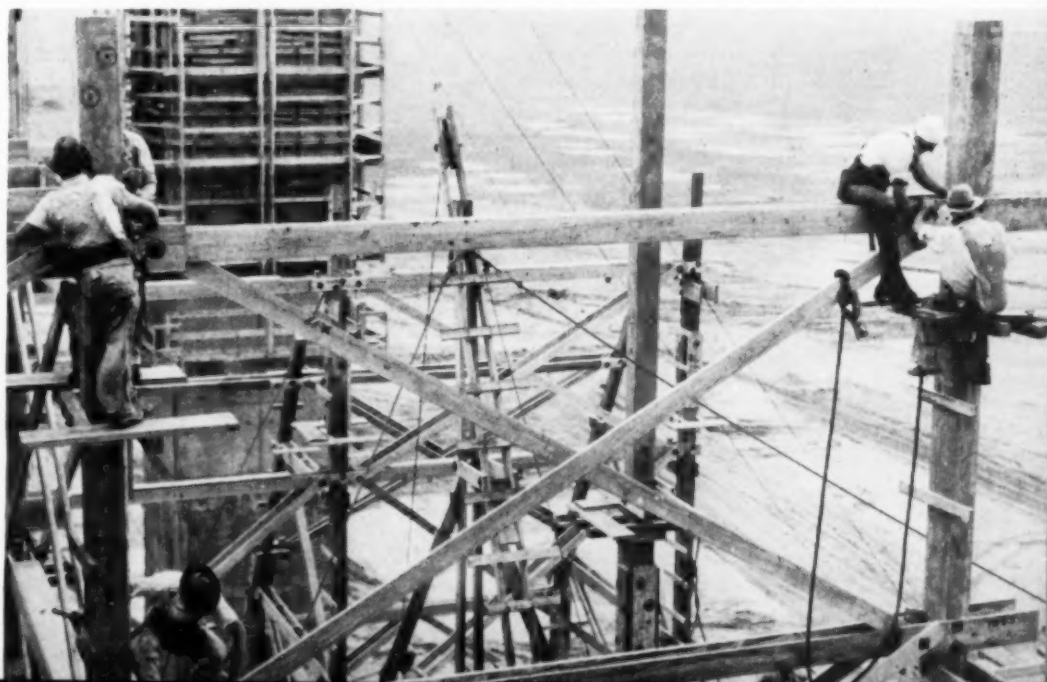
braced by normal methods, repeated for each position of the traveler. Erection of each arch required the raising and splicing of four prefabricated truss sections, assembled in a yard near one end of the hangar. At each location of the traveling scaffold, the four stiff-leg derricks erected two complete arches, with all intermediate bracing and roof framing. Roof sheathing was completed as the work progressed to make the structure safe against high wind pressures.

In erecting an arch, each derrick on the scaffold handled one section. After the section had been set in position on the scaffold, the derrick assisted in adjusting the free end of the truss to make

(Continued on page 120)



TOWER FRAMING (below) of timber scaffold employs vast quantity of horizontal and diagonal braces. All joints are made with timber connectors, principally split rings, to develop shear strength.





CONSTRUCTION BEGINS on embankment approach to elevated crossing of U.S. 190 to replace 20-ft. concrete roadway, at left, which will be flooded during high water on Morganza Floodway.



FROM BORROW PIT Euclid wagons, loaded by dragline, deliver earth for approach embankment.

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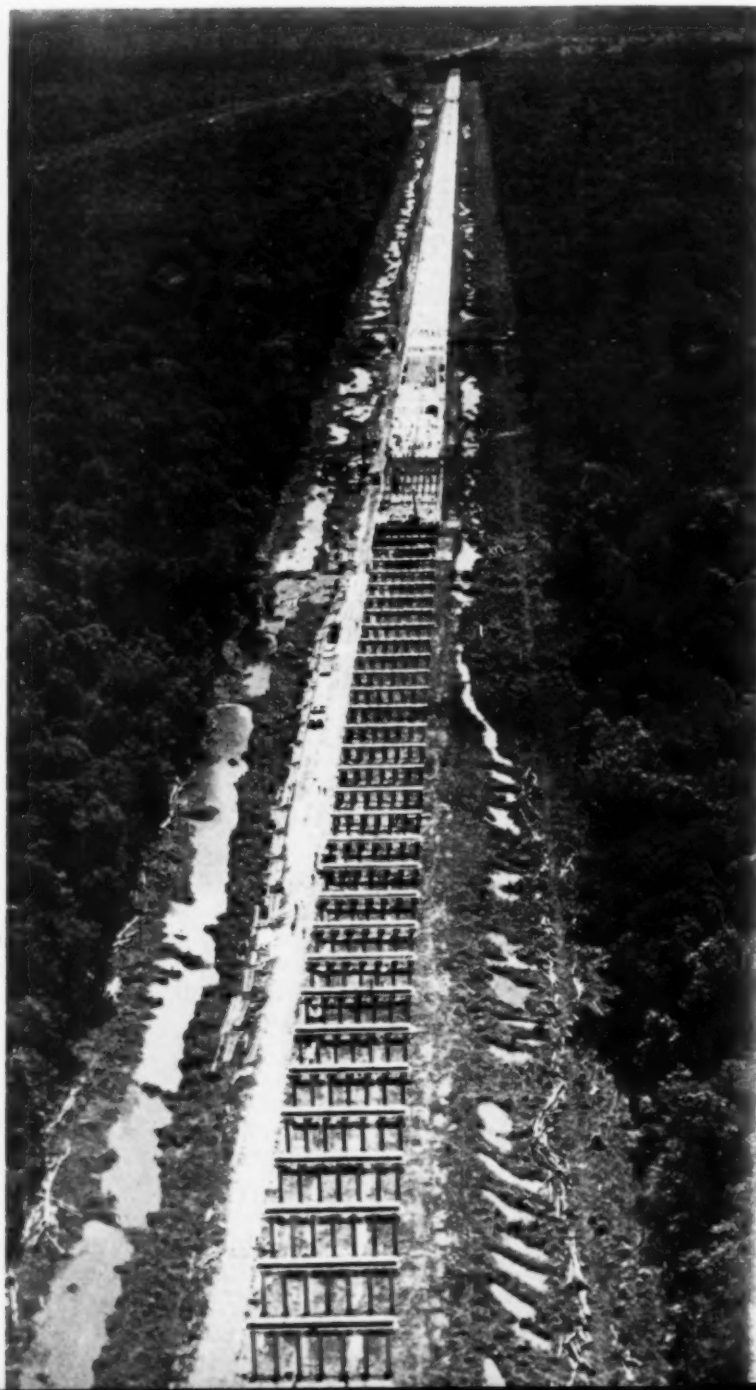
CENTRAL BATCHING AND MIXING PLANT (below), located 0.8 mi. from east end of project, serves pile-casting yard from which finished piles, up to 90 ft. long, are picked up by traveling gantry crane and loaded on railway cars for delivery to point of use. Yard has capacity of 220 piles.



FLOODWAY CROSSED BY *Long* *Concrete Bridge*

SUPPORTED BY
86-FT. PRECAST PILES

SEVEN-PILE BENTS (below), in foreground, are capped and ready for deck spans. Deck provides 50-ft. wide divided-lane roadway.



SUPPORTED BY 24-IN. SQUARE CONCRETE PILES precast in lengths averaging 86 ft., a high-level four-lane concrete girder bridge 18,778 ft. long, comprising 458 spans of 41 ft., has been built to carry relocated U. S. Highway 190 in Louisiana across the Morganza Floodway, which will divert 650,000 sec.-ft. of Mississippi River flood waters between parallel levees through the Atchafalaya River basin and into the Gulf of Mexico.

The contract for the project was awarded to T. L. James & Co., Inc., of Ruston, La., and the Keliher Construction Co., of Dallas, Tex., for \$3,324,998. The contractors started moving in their forces on March 15, 1941. A central mixing plant was set up about 0.8 mi. from the east end of the bridge. First operations included grubbing an area 35 ft. wide on each side of the centerline of the bridge and building about 6 mi. of standard-gage railway track to serve the entire length of the bridge and provide passing and yard tracks.

Test piles were driven with a whirler-type driver of steel construction equipped with a 48-hp. oil-fired boiler, 110-ft. leads, and a No. OR Vulcan single-acting pile hammer. As a result of studying test-pile performance, a seven-pile bent using 24-in. square piles was adopted for the structure. The pile-casting yard was located along the service track and had a capacity of 220 piles in lengths up to 90 ft. The 10-pile platforms were built on foundations of wood piling. Bottom forms or pallets were pine lumber sanded to a smooth finish; side forms were metal. Reinforcing cages for the piling were fabricated in the center of the yard and placed in the forms by gantry crane. Sixteen piles were usually cast at night, using high-early-strength cement. After curing, they were moved by the gantry from the forms to cars and carried to the point of driving.

Permanent piles were driven with an oil-fired, 60-hp. steam rig with 113-ft. leads, and equipped with a No. OR Vulcan

(Continued on page 138)

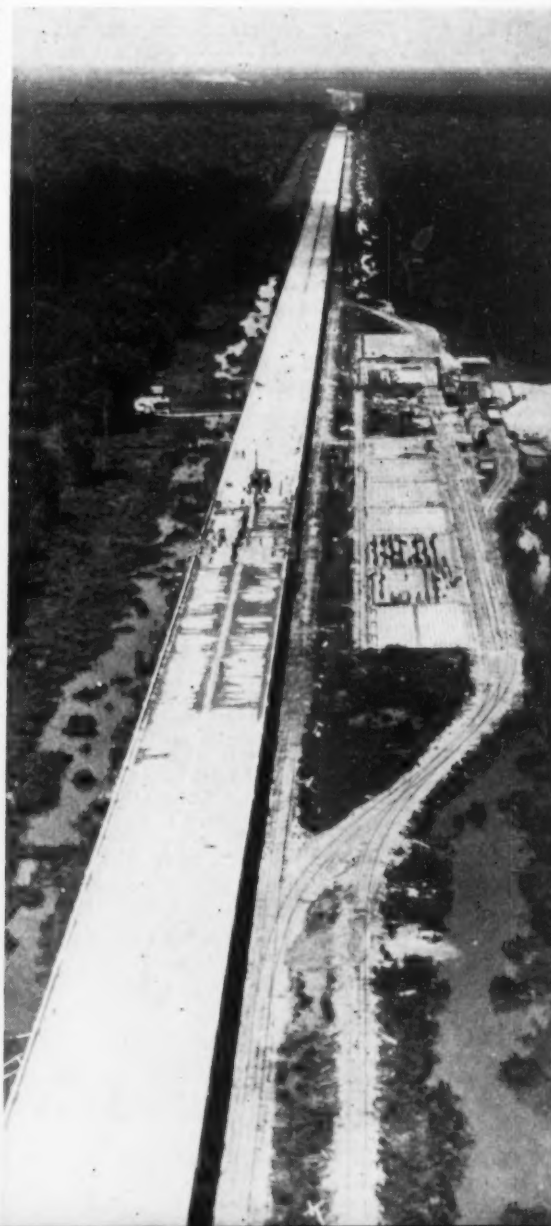
NEW HIGH-LEVEL TRESTLE, center, nears completion. It replaces U.S. Route 190, shown at right. At left is N.O.T. & M. Ry. trestle, also under construction, and next to it is old U.S. Highway 190, which was abandoned in 1934. In distance is three-span highway bridge over Atchafalaya River.



HEADER OF EMBANKMENT APPROACH to high-level bridge is shown, with piledriver in foreground.

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SIX MILES of standard-gage railway track runs parallel to bridge (right), to deliver precast piles and concrete for bridge superstructure to various points of deposit. Pile-casting yard is located along track.



Public Relations FOR CONTRACTORS

Thoughts on How to Sell the Public on the Contract System and Your Particular Construction Company

By **GEORGE C. McNUTT**

Advertising and Public Relations Manager,
R. G. LeTourneau, Inc.,
Peoria, Ill.

PUBLIC RELATIONS may smack to you of press agency, but public relations are more than pieces in the paper. Public relations are your construction company's manners—to be good, you, and everyone on your job, have got to live them. Some of the ideas advanced here you won't be able to use right now because of war regulations, but all of them can be applied after the war.

Start With Contract Award

Public relations can begin shortly after you are awarded the contract. Start by calling on the local newspaper editors, particularly if your job is a good-sized one. Tell them the purpose of the job and probable benefits to the local community; its extent in price, yardage length; how many employees will be required, particularly if many of them are to be hired locally. Don't get too griped if the story doesn't appear just the way you think it ought to. Remember, newswriting is the paper's job, not yours. In the main, you'll find if you take the trouble to keep newspapers informed and give them reasonable answers when they call you, that you will enjoy a good press.

When you're ready to start actual work, see if the local mayor or chairman of the supervisors would like to dig the first scraper load or shovelful of earth. If so, you're almost a cinch for a newspaper picture or story.

If you're entering a new community, an

advertisement of greeting will not be amiss. Put some selling into the ad. Tell 'em what you're up to and how having it done by contract is the best way.

See layout and copy thoughts below for some suggestions as to what might go into such an ad. . . .

Headline: To the Citizens and Taxpayers of the
Greenville Area . . .

Main Head: Joe Doakes Construction Co. Will Be
Digging Here June 1

Main Subhead: Our Contract to Relocate
Highway 76 Will Cut 2 Miles
Off Trips to Emerald City

THE MAYOR digs first
shovelful of earth, mak-
ing project "news" for
local press.



Follow this with a few highpoints of the job and possibly a map showing job location.

Subhead: 300 Doakes Employees Will
Be Spending Money With
You

Here you might give some data on how you pay the union wage scale, what the approximate weekly or monthly payroll will be, etc.

Subhead: How Contract System Saves
Taxpayers' Money

A few thoughts to sell Contract System as opposed to WPA-type of construction.

Subhead: Contractors Since 1923

Some background on the Joe Doakes Construction Co., including some of the other big jobs you've handled. Talk up your experience and "know how".

These are just a few suggestions. You probably will think of many other items which could be included. Each job will call for a slightly different treatment.

What about the cost? Well, in smaller population centers, newspaper space costs very little, probably less than \$100 a page and you may find you can tell your story in much less than a page. In larger centers, you would advertise only big jobs, so the cost proportionately wouldn't be heavy.

What about copy and layout? The newspaper's advertising staff will gladly help you or, if you handle quite a volume of work, you may find it advisable to hire an advertising agency.

Don't overlook luncheon clubs, church fellowship groups, student engineering societies and the like. They are always looking for speakers. If you or some one in your organization is a good speaker, you may be able to make your job good

for 2 or 3 appearances before the same club—one shortly after being awarded the contract, one midway of the work and again at its completion. Everyone of these appearances gives you a chance to talk the benefits of the contract system.

Don't beg off because you think you have no story to tell. Every contractor has job experiences the ordinary business man wants to hear. You can explain some of the simple nomenclature of contracting—things like "cuts," "fills," "borrow," "station yards," what the marking on stakes means, why drainage ditches, and a lot of other things which seem commonplace to you, but give the layman a feeling that he's in the "know." Better use chalk and blackboard when describing these terms.

Hunt up the local angles of your job when talking. If it's being built with gas tax funds, give the audience credit for having produced at least part of the funds. Probably the local newspaper editor or Chamber of Commerce secretary can give you a history of the efforts to get the project approved. Praise the local groups who made it possible. Point out that you're a business man, too, and have your ups and downs just the same as other business men. Tell them something about the specifications with which you have to comply. Give them an idea of the experience and engineering skill of your firm.

After the job is fairly well along, give some thought to having the local Rotary, Kiwanis, Lions or other clubs visit the job as your guest. Folks like to watch excavating equipment. Provide several guides, so the members can get questions answered. This will provide a good opportunity to show, right on the ground, what you meant by some of the terms you may have discussed when talking to them at a previous meeting in town. If you have your own cook shack, shoot the works and feed 'em right on the job.

Should it seem impractical to take a large group over the work, then by all means invite the local newspaper publishers and editors to go over the job with you.

Use Movies

If you're a camera or movie fan or addicted to keeping progress records by means of photography, devote those photographic records to public relation uses. Do a bit of editing so your movies have a good tempo, then tell your story as the various scenes flash on the screen. Movies are always good. By having them titled, they can be shown, even though none of your organization is available to speak. Even in movies it's possible to get in some effective plugs for the contract system by showing the contrast between the WPA-wheelbarrow method and your own big-yardage equipment. And you might throw in a few comments about the relative cost



GOOD WILL is fostered by inviting prominent local officials and business men to inspect project and lunch at contractor's commissary.

per yard to the taxpayer of the two methods.

You can easily have slide or strip film made from your still photographs. It's easy, too, to include engineering drawings in such film to illustrate points on which you have no photographs or photographs are inadequate. Where you have a large job, a slide film shown as the work nears final completion makes an instructive and interesting program for a club or school group—especially engineering students.

Public Relations at the Job

Some jobs aren't large enough to make many of the above suggestions practical, but on all jobs, large or small, there's a place for public relations. AGC members usually erect signs saying "This job is built by contract, etc."

Good, but not good enough. If it's a dam or an irrigation project, why not say so and tell how large an area it will cover or serve? If it's a highway job, let the sign say you're sorry about detours, but when the project is completed it will be 1.3 mi. shorter to Emerald City and safer because three dangerous curves will be eliminated. Sell both the job and the contract system. Your sign can help.

When detours are necessary, try to keep them smooth and as free of dust as possible. It's not much of a job to run your motor or blade grader over the detour once a day—or if you haven't either, use a scraper; carry some earth in the bowl to fill in bad holes. Use a sprinkler to keep dust down. If the detour carries

a heavy traffic load, it may even pay to use oil. Remember, smooth, dustless detours are not only good public relations; they make your job safer for your own equipment, they prevent accidents and possible lawsuits.

The public can get rather irksome at times, but remember they are the taxpayers who provide the funds. Impress that thought on your men. See that they answer questions about directions and detours courteously and with a smile. Every man on your job should be building good will for you and the contract system.

If enough individual construction firms do a good public relations job, the industry as a whole naturally will profit. However, there are many things AGC groups could do to promote the contract system. Already some of the state AGC groups are doing considerable. I have seen at least three or four rather creditable ads appearing in West Coast construction papers over the signatures of local AGC members. I am inclined to feel, though, that additional media should be used.

Confining the story to ads in construction papers only is too much like advertising shoe repairing to cobblers only. It's the public you want to reach, so add popular media to your construction paper list.

You've got plenty to tell and you know the contract story much better than I—so I'll confine my suggestions along that line to a few points that haven't seemingly been stressed. They are:

- (1) The contract system puts a premium

(Continued on page 152)

HOW

They Did It

CONSTRUCTION DETAILS

For Superintendents and Foremen



SHAFT REPAIR on main axle of Adams road grader used by County of Perth, Ontario, is made without removing shaft after broken bearing has gouged steel. Turning shaft by power from grader engine, Zapfe Machine Shop, Kitchener, Ont., uses lathe compound installed on rear housing first to prepare steel by grooving for building up with sprayed metal and finally to finish metallized part to original dimensions. Repaired shaft is still in excellent condition after 2 years' service. This repair job won \$25 prize for Paul Ziegler, of Zapfe Machine Shop, in Metco conservation contest of Metallizing Engineering Co., Long Island City, N. Y.



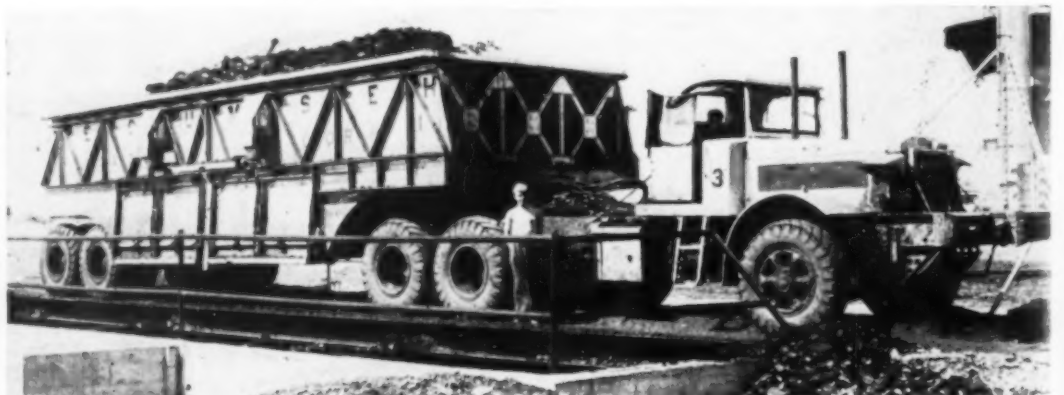
CLEARING OF RESERVOIR SITE behind Mosquito Creek Dam between Warren and Cortland, Ohio, required cutting of trees ranging from 7 to 15 in. in dia. on 1,500-acre area. To expedite this work, D. D. Mullett Co., contractor, of Pittsburgh, Pa., equipped its workers with Davey pneumatic saws served by portable compressors. Saws were used for tree felling, bucking and log cutting. Saw, mounted in frame of steel tubing, is clamped to tree by "dogs" to assure straight cut and relieve operator of holding saw in place and resisting thrust of tool.

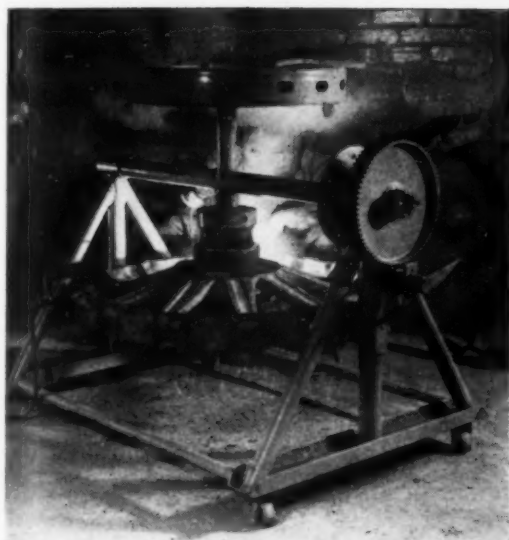
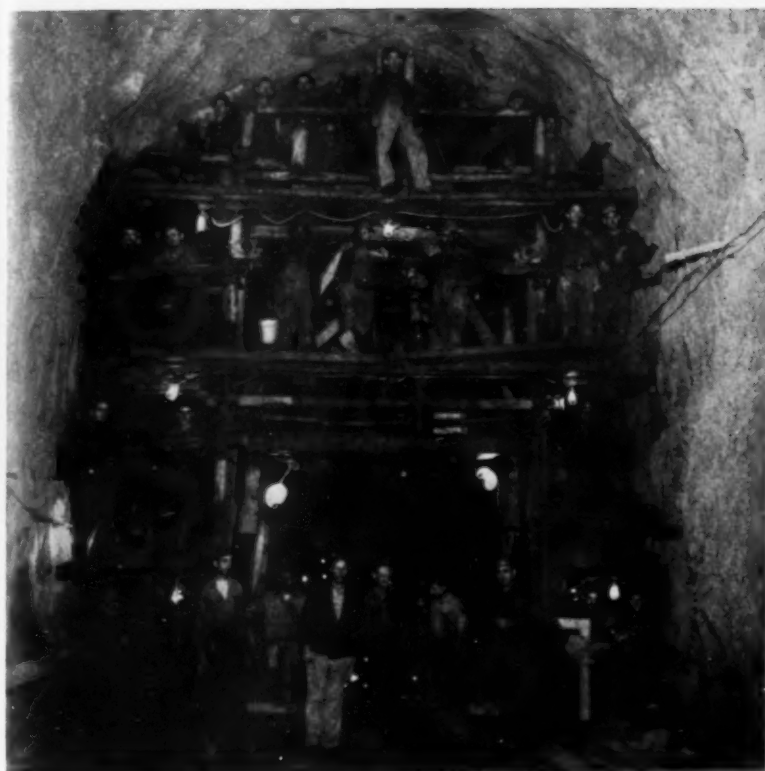


30 AND 50-TON LOADS of coal and metallic ores needed for production of war critical materials are now being handled by truck haulage, instead of rail transport, in mining operations in the United States, Canada and Mexico. Loaded by large diesel and electric power shovels, Mack super-trucks, mostly diesels, can negotiate almost any open cut or other off-highway route under their own power. Units illustrated herewith are 30-ton truck (above) and 50-ton truck-trailer (below). Huge sizes of trucks are indicated by comparative heights of men in foregrounds.



PRECAST CONCRETE GRATINGS (left) with rounded tops replace cast iron on drop inlets of highway construction project built by Horvitz Co., Cleveland, for Ohio Department of Highways.



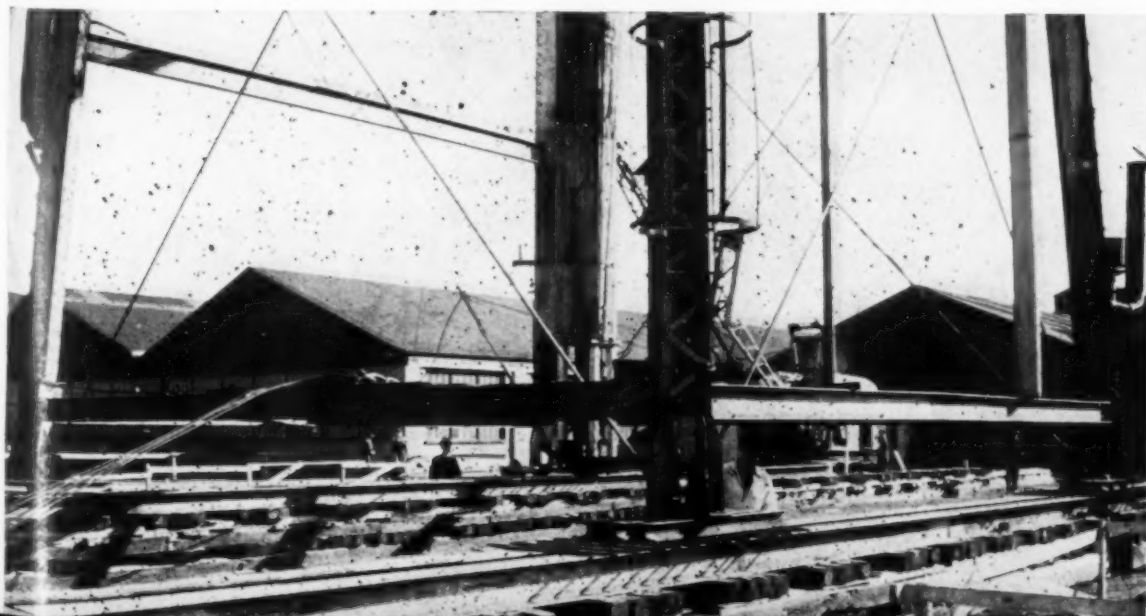


WORN SPROCKET RIMS of tractor sprocket wheels are replaced by cutting spokes to equal length around hub with special holding fixture and then welding on new sprockets at service shops of H.O. Penn Machinery Co. in New York, Poughkeepsie and Mineola, N. Y., under direction of Wilnot Sandham, general service manager. Welded connections are V-notched on both sides of spokes, and grooves are filled in with weld metal.

THREE-PLATFORM JUMBO, mounting 13 Ingersoll-R and drifter drills (above, left) equipped with power feed is used by Bates & Rogers Construction Corp. of Chicago, to drive 4,000-ft. long rock tunnel through Blue Ridge Mountains in Virginia for Chesapeake & Ohio Railroad. New tunnel, replacing and parallel to old bore completed in 1858, has finished concrete-lined cross-section 18 ft. wide and with clearance of 22 ft. above top of rails. Platforms of jumbo at three levels have hinged extensions at sides for folding back when rig is moved. Full face of rock bore, with maximum dimensions of 28x24 ft. in timbered sections, is blasted with delayed exploders at one time; 60-75 drill holes, each 10 to 12 ft. deep, are required per round. Rear end of jumbo (above) is equipped with two air-driven hoists and serves as "cherry-picker" for placing empty cars at head of muck train.

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WATER TANK, 120 ft. high and weighing 80 tons empty, is moved 385 ft. in two directions by Rust Engineering Co. to allow industrial plant expansion. Four tower legs (below) are tied together with 10-in. I-beams welded 2 ft. above feet. Main water feed line is braced by welding two channels to standpipe and burning holes in each end of channel to receive turnbuckles and cable run at 60-deg. angle to tower legs. Cribbing is laid to form solid bearing for two 10-in. I-beams for running rails. Tower is jacked up by eight screw-jacks. Top rails are railroad rails turned with flat side against tower leg base plate and bolted in position. Small rollers 1 1/4 in. dia., improve control. Pulling power for tank (shown in motion at right) is furnished by dead-man from which is lashed 10-ton hand crab. Running from drum to main two-way sheave lashed to back legs is 3/4-in. load cable to give pushing method of movement. Cable is attached to two-way sheave over front I-beam to place control point at dead center between two front legs and provide down pull.



Muck and Mud at Alaska... Rugged Hills



GASOLINE

CLETRAC *True-Trac*

Is of Italy... Bottomless Roads of Russia...

have Proved

CLETRAC TRU-TRACTION

Again and Again

For twenty-five years Cletracs have had controlled differential steering — which simply means power on *both* tracks at *all* times. We call it *Tru-Traction*.

Practically every high-speed crawler-type military vehicle has employed this type of power application. And how its value has been proved on countless military roads and plains where other types of equipment would have stalled and bogged down!

Isn't it sensible then, to apply this same kind of power—*Cletrac Tru-Traction*—on *your* jobs where you must have positive power on both tracks at all times—power to make a *full* turn with a *full* load—power to go through tough going—power to spot loads easily—power that will get you there regardless of ground and weather conditions?

Then rely on Cletrac—the only crawler with *Tru-Traction*.

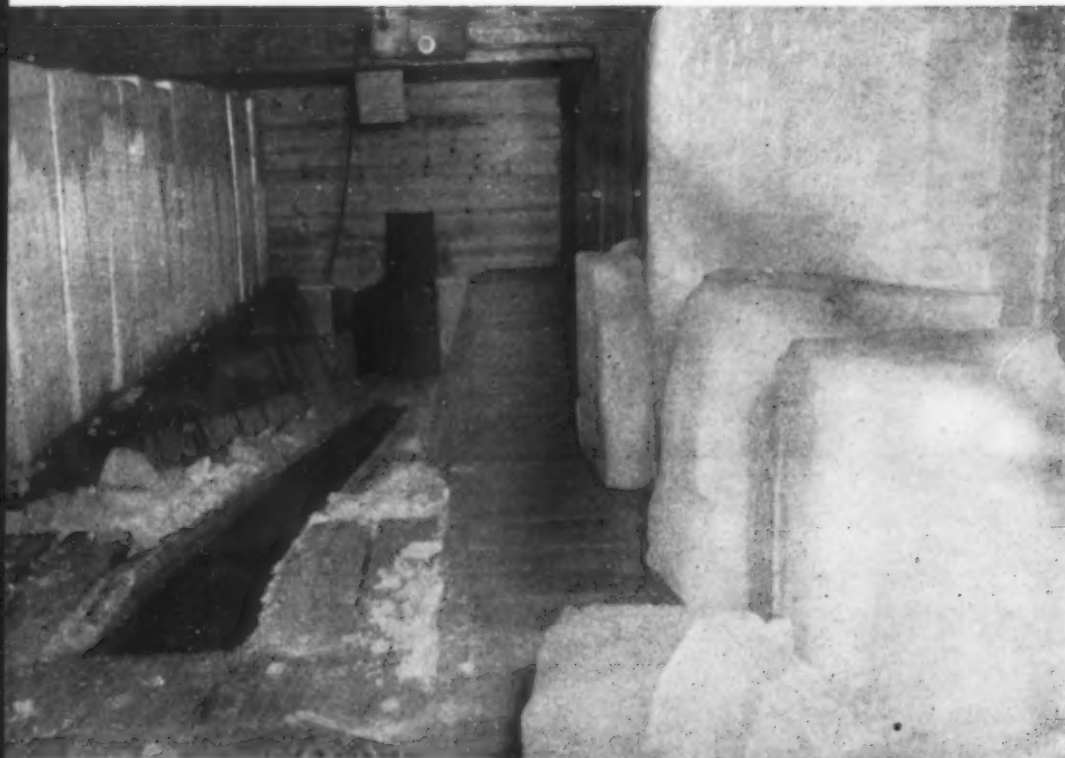
THE CLEVELAND TRACTOR COMPANY • CLEVELAND, OHIO



Traction **TRACTORS**

D I E S E L

ICE AND REFRIGERATED WATER *Reduce*



ICE CAKES made on job are delivered through chute to storage and crusher house where ice is crushed for feeding on belt conveyor carrying batched aggregates to mixing plant.

TWO METHODS of controlling concrete temperatures enter into the construction of Norfork Dam, 1,500,000-cu.yd. structure being placed across the North Fork River in north-central Arkansas by The Utah Construction Co. and Morrison-Knudsen Co., Inc., contractors for the U. S. Engineers. Low-heat cement, supplied by the government, is used in the concrete. To keep the temperature of concrete batches within the allowable maximum at the time of placement in hot weather, crushed ice is added to each batch, and mixing water is cooled by a

refrigerating machine. In the dam itself, a temperature gradient is maintained from the foundation rock up into the body of the dam by installing cooling pipes on the rock and on top of each 5-ft. lift in the lower portions of the structure. Cold water, chilled by a refrigerating plant in hot weather, is circulated through the cooling pipes.

Cooling Concrete Batches—Concrete batches in hot weather are kept within a maximum permissible temperature of 75 deg. F. when placed in the dam by cooling the mixing water and by adding

crushed ice to the batched aggregates on a belt conveyor delivering to the mixing plant. Ice for the latter purpose is produced on the job under subcontract by the Vance Thompson Ice Co., McCrory, Ark. The subcontractor makes ice by the ammonia-brine process and delivers 300-lb. cakes through an inclosed chute to a storage and crusher house operated by the prime contractors. Here the ice is crushed, and weighed quantities are discharged on to the aggregate belt.

Original contract specifications stipulated a maximum concrete temperature of 67 deg. Under a later speed-up agreement which accelerated concrete progress about 22 percent, the contractors were not required to increase plant facilities, and the maximum temperature was raised to 75 deg. The ice plant has a capacity of 80 tons in 24 hr., and the storage is 15 tons. Concrete temperature is maintained as near 67 deg. as plant capacity will allow. For 3,000 cu.yd. in 24 hr. the contractors usually have been able to keep concrete at a temperature below 75 deg. with 80 tons of ice. On hot summer days, ice requirements have averaged 300 lb. per 4-yd. batch.

Reducing Heat in Mass Concrete

To assure a solid bond to the foundation rock and tight vertical contraction joints between monoliths at the base of the dam, the lower lifts of concrete are cooled by embedded pipe coils carrying circulating cooling water which dissipates the chemical heat generated by hydration of cement. Concrete for the interior of the dam contains 3 bags of cement per cu.yd., while exterior concrete (to an average depth of 5 ft. from the exposed surfaces) has a cement content of 4 sacks per cu.yd.

Cooling periods on successive 5-ft. lifts

Page 86

PIPE COILS (below) of 1-in. tubing are installed on foundation rock preparatory to placing first lift of concrete. Cooling water is circulated through these coils to dissipate heat of hydration of cement.



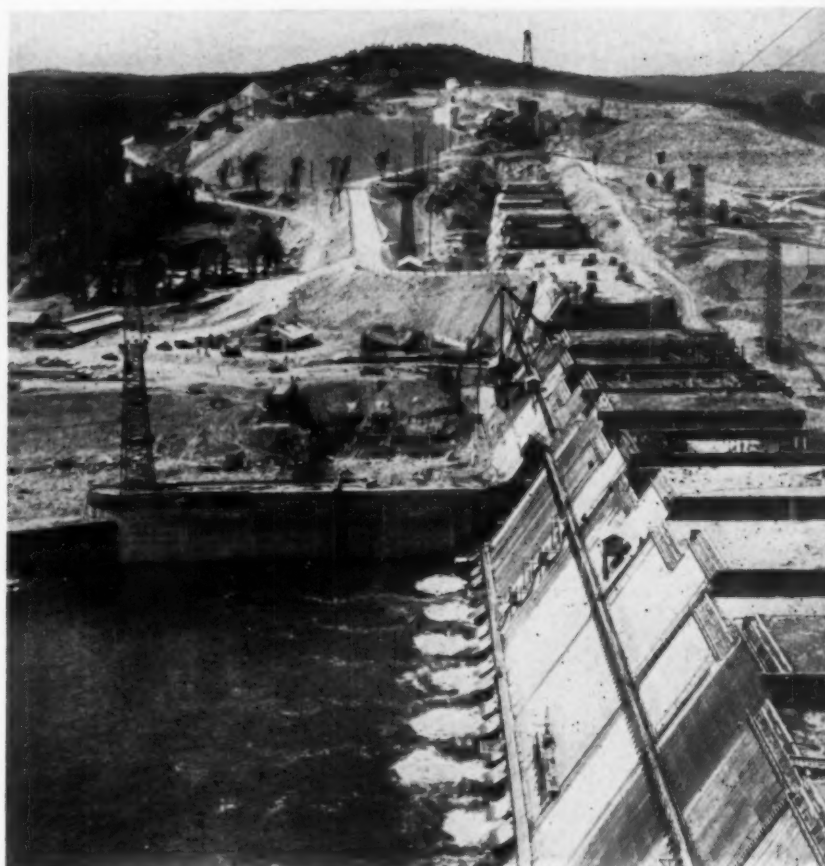
LOWER LIFTS OF CONCRETE (below) are cooled by pumping water through pipe coils for varied lengths of time necessary to establish temperature gradient from foundation up into body of dam. Note coils on nearest block.



Ice Concrete Temperatures AT NORFORK DAM



CRUSHED ICE in weighed quantity is discharged at crusher house on top of batched aggregates riding belt conveyor to mixing plant.



NORFORK DAM, requiring 1,500,000 cu. yd. of concrete, makes use of two cooling water plants and an ice plant to control concrete temperatures in hot weather. Adjacent to mixing plant, below head tower of cableway system, are refrigerating plant to chill mixing water and ice plant to furnish crushed ice for concrete batches. At lower level on downstream side of dam is cooling plant which supplies cold water for circulation through pipe coils embedded in mass concrete of structure.

Page 27

are regulated to establish a straight-line temperature gradient from the foundation rock into the upper part of the dam where no cooling is employed. This procedure eliminates abrupt temperature changes and resultant variation in expansion and contraction of adjacent horizontal layers of a monolith.

Embedded cooling coils in the dam are made up of more than 110 mi. of 1-in. O.D. 12-gage steel tubing. On the foundation rock, the tubing is spaced on 2½-ft. centers, following the contours as closely as possible, with the coils at no place more than 1 ft. 3 in. above the rock. Above the foundation, the coils are placed on top of the concrete lifts, and the tube spacing is 5 ft. Coils are contained entirely within the limits of single monoliths; the tubes do not extend across contraction joints.

Specifications limit the length of a coil to 1,200 ft. and require that water not exceeding 50 deg. F. in temperature be pumped through the tubing at a rate of 3 to 4½ g.p.m. During the summer, cooling water for the circulating system is cooled by a refrigerating plant. In winter, river water is used. The coils are put in operation, with water circulating through the tubing, before any concrete is placed.

Electrical resistance thermometers,
(Continued on page 114)

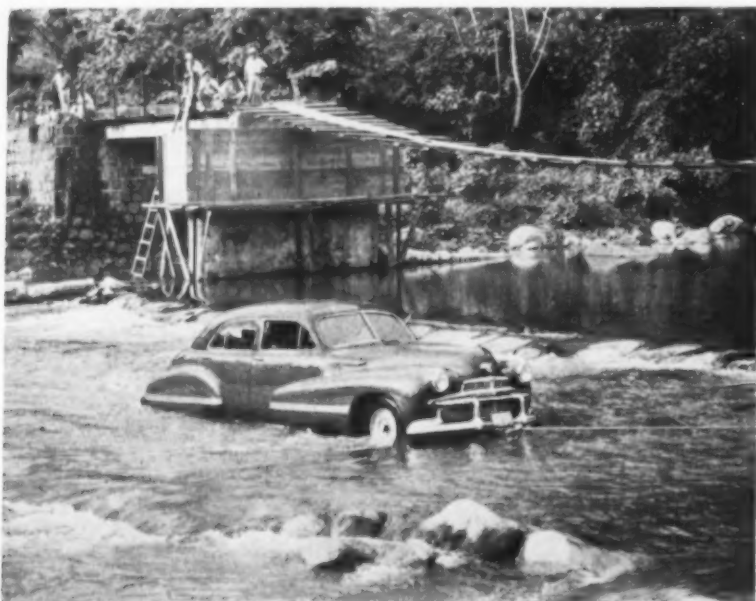
Three previous illustrated articles on Norfolk Dam have appeared in *Construction Methods* as follows: October 1943, p. 62; November 1943, p. 78; January 1944, p. 66.

WITH COOL WATER CIRCULATING (below) through pipe coils, first lift of concrete is placed by cableway bucket on foundation rock.





LAST SECTION of water supply pipeline from Calallen to Corpus Christi, Tex., is christened by Corpus Christi's MAYOR A. C. McCAUGHAN, who breaks against it bottle containing water from Calallen plant. Placing of 16 mi. of 36-in. mono-cast centrifugal cast-iron pipe was directed by E. N. NOYES (center), of Myers & Noyes, consulting engineers, of Corpus Christi and Dallas, for FWA, of which F. R. SLOAN, right, is regional engineer. American Cast Iron Pipe Co. Photo



AUTOS ARE PULLED by cable through streams on Inter-American Highway while bridges are built. In background is masonry abutment for new bridge crossing Petaculapa River in Guatemala. Marine Corps Photo



NEW-STYLE ARCHITECTURE (right) in air-raid shelters is discovered in Naples, Italy, after Allied occupation.

Wide World Photo



JACK-OF-ALL-TRADES, with particular adaptability as boat or barge carrier, is this wheel-mounted steel frame (above and below) equipped with pair of chain-hoists and topside assembly of metal drums which act as pontoons to provide buoyancy for rig, converting it into small-scale floating drydock. It is here shown in use by Navy forces on Attu Island, in the Aleutians, and is handling landing craft. Outfit is hauled by crawler tractor. Official Navy Photos

Have you heard about

“F”

THE TIMKEN SERIES ROCK BIT?

THE Timken “F” Bit was developed to meet peculiar and specific drilling problems. However, in surmounting them its performance was so outstanding that it gave promise of possible wider use. That was 4 years ago. Not many rock bit users know about it today because we wanted to be absolutely sure this bit would be adaptable to drilling problems similar to those for which it was designed.

It is available in 1 $\frac{5}{8}$ ”, 1 $\frac{3}{4}$ ”, 1 $\frac{7}{8}$ ” and 2” gauges with either center or center-side hole. Despite its small size the bit has a wall thickness comparable to other series of larger Timken Bits.

The basic idea of this small gauge bit is its ability to drill *faster*. However, there are many additional advantages through the use of the “F” Bit where ground conditions permit the employment of small starter gauges. Write for further information.



TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
ROCK BITS

THE TIMKEN ROLLER BEARING COMPANY
CANTON, OHIO



CURRENT AND POST-WAR HIGHWAY PROBLEMS are discussed at 41st Annual Meeting, Chicago, Feb. 1-3, of American Road Builders' Association, by (left to right): CHARLES M. UPHAM, engineer-director, A.R.B.A.; SAMUEL C. HADDEN, president, American Association of State Highway Officials and

chairman, Indiana Highway Commission; H. E. HILTS, deputy commissioner, Public Roads Administration; CHARLES H. LIPSETT, New York; HON. J. W. ROBINSON, chairman, Committee on Roads, U.S. House of Representatives; and ROBERT B. BROOKS, consulting engineer, St. Louis, Mo.



ELECTED PRESIDENT of Associated Equipment Distributors at 25th Annual Convention in Chicago is G. W. VAN KEPPEL, (left) president, G. W. Van Keppel Co., of Kansas City, Mo., who succeeds Edward P. Phillips.

ADOLPH J. ACKERMAN (right), director of engineering, Dravo Corp., Pittsburgh, Pa., has been named chairman of executive committee, Construction Division, American Society of Civil Engineers, succeeding Harry O. Locher. Graduate of University of Wisconsin. Mr. Ackerman has had extensive experience in design and construction of large dams and hydroelectric plants, having served with Stone & Webster, Inc., Aluminum Co. of America, W. E. Callahan Construction Co., and the Tennessee Valley Authority, where he acted as construction plant engineer. In collaboration with Charles H. Locher, he is author of the book, "Construction Planning and Plant", 381-p. practical manual of methods and equipment, based on series of 26 articles written originally for "Construction Methods."



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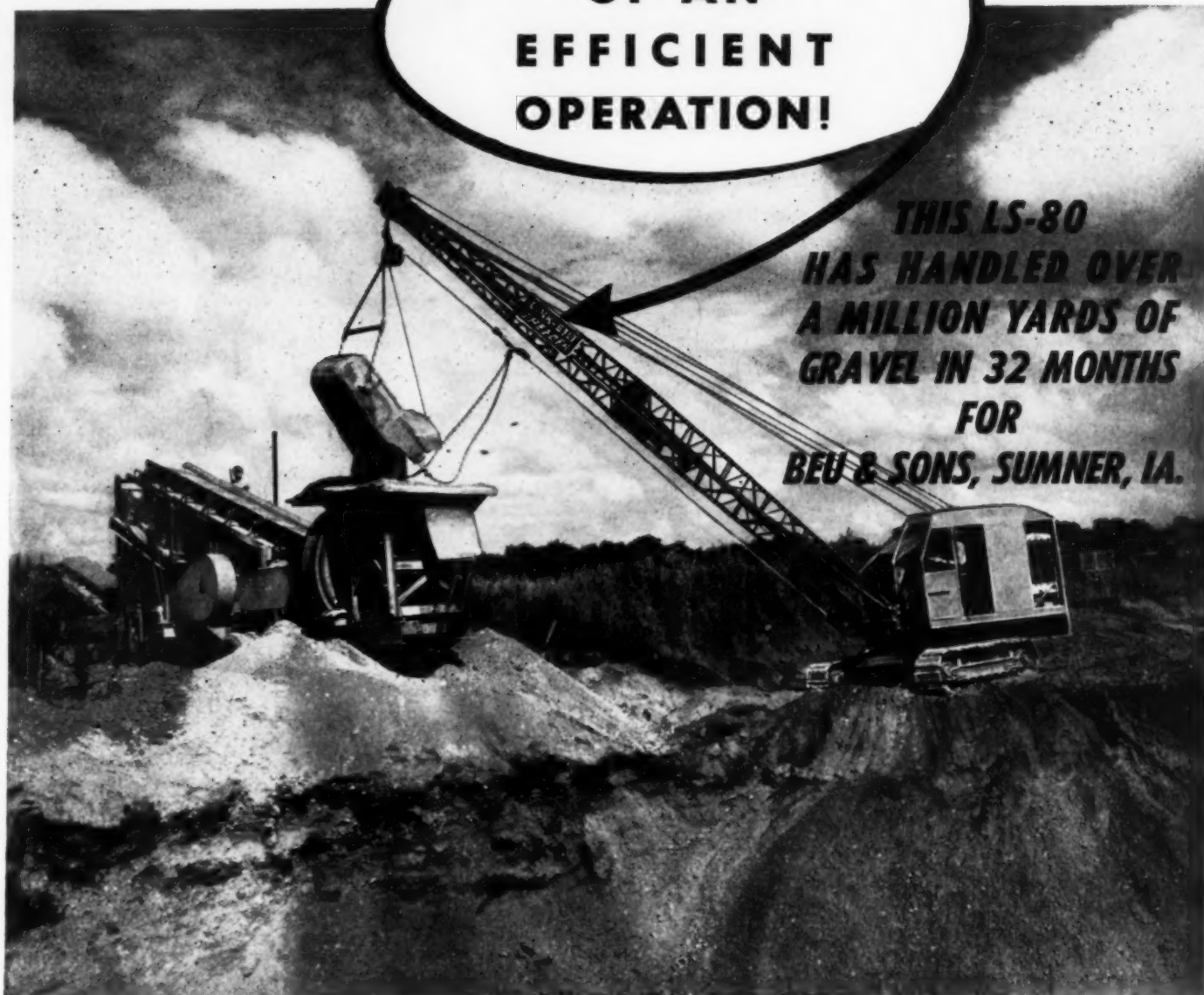
NEW BOARD OF DIRECTION (below) of American Society of Civil Engineers holds first meeting. Around table clockwise, beginning in left foreground, are FRANK C. TOLLES, RALEIGH W. GAMBLE, FRANKLIN THOMAS, GAIL A. HATHAWAY, WILLIAM D. SHANNON, DEAN G. EDWARDS, WILLIAM D. DICKINSON, SCOTT B. LILLY, CHARLES F. GOODRICH, FRED C. SCOBEY,

REAR ADMIRAL R. E. BAKENHUS, A. M. RAWN, NATHAN W. DOUGHERTY, T. R. AGG, E. B. BLACK, E. M. HASTINGS, V. T. BOUGHTON, CHARLES E. TROUT, CAROLINA CROOK (secretary to Mr. Seabury), Secretary GEORGE T. SEABURY, MALCOLM PIRNIE, newly elected president; WILBUR M. WILSON, R. E. DOUGHERTY, S. C. HOLISTER, and ROYCE J. TIPTON.



**A SURE SIGN
OF AN
EFFICIENT
OPERATION!**

**THIS LS-80
HAS HANDLED OVER
A MILLION YARDS OF
GRAVEL IN 32 MONTHS
FOR
BEU & SONS, SUMNER, IA.**



★ BUY BONDS ★
AND
★ MORE BONDS ★

Contractors all over the United States have found that there is extra profit in the extra strength and stamina built into these finger-tip operated machines. They are engineered for long, maintenance-free service and are giving that service even under the stress of war-time strain. There are 25 different models available—a type and size to fit every job.

LINK-BELT SPEEDER

Builders of the Most Complete Line of
SHOVELS-CRANES-DAGLINES
LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO-9, ILL.
(A DIVISION OF LINK-BELT COMPANY)



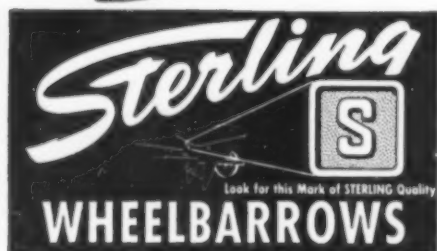
Chinese Loads are BALANCED

Here's another good example of Chinese ingenuity. Cargo-carrying wheelbarrows are loaded to the "gills", but the load is **BALANCED** in such a way that only a minimum of effort is required to push the barrow.

Sterling Wheelbarrows are well known for their labor-saving qualities. Sterling sturdy, **BALANCED** construction centers the load above the wheel . . . makes wheeling a snap . . . permits more loads to be handled per day.

Yes, there are some Sterlings available now for civilian use—but only a few. Tell us about your urgent needs. We'll sincerely endeavor to take care of them.

STERLING Wheelbarrow Co.
Milwaukee 14, Wisconsin



A 4302-1/2

CONSTRUCTION EQUIPMENT NEWS

MARCH, 1944 REVIEW of Construction Machinery and Materials



INSULATION FOR ROOFS, walls and partitions is provided by Foamglass, made in the form of 12x18-in. blocks in thicknesses of 2, 3, 4, 4½ and 6 in. and composed of tiny cells of inert air sealed in glass. These blocks, consisting of 9 parts air to 1 part glass, weigh only 10.5 lb. per cu. ft. Advantages claimed for them are durability, low conductivity, rigidity, moisture proofness, light weight and fireproofness. Blocks are bedded in hot tar or asphalt mopped on roof deck and, when in place, receive a similar surface coating preparatory to laying of built-up roofing upon them. The blocks have a crushing strength of 150 lb. per sq. in. and support their own weight as wall-insulating material or in partitions. Foamglass blocks can be cut and shaped on the job, where necessary, to fit around roof projections or openings. They are applicable to roofs of wood, concrete, gypsum or steel construction.—**Pittsburgh Corning Corp., 632 Duquesne Way, Pittsburgh, Pa.**

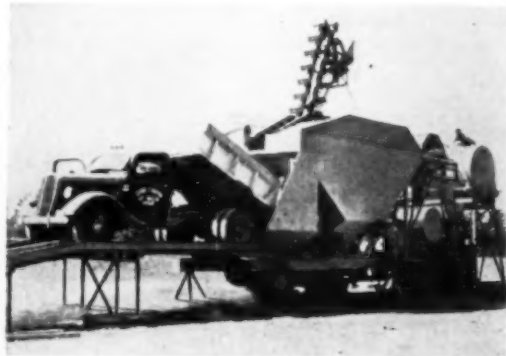
★ ★ ★

A DEGREASING AND CLEANING MEDIUM for machinery and metals, known as Penetone, contains neither carbon tetrachloride nor trichlorethylene, chemicals not now available except on WPB allotment. It contains nothing that is toxic, inflammable or injurious to the skin. Penetone comes in two formulae: The standard grade is suitable for more than 80 percent of all applications, including degreasing jobs where lighter types of greases and oils are used, as well as general maintenance. "Senior" grade, stronger concentrate, is recommended for use on heavy

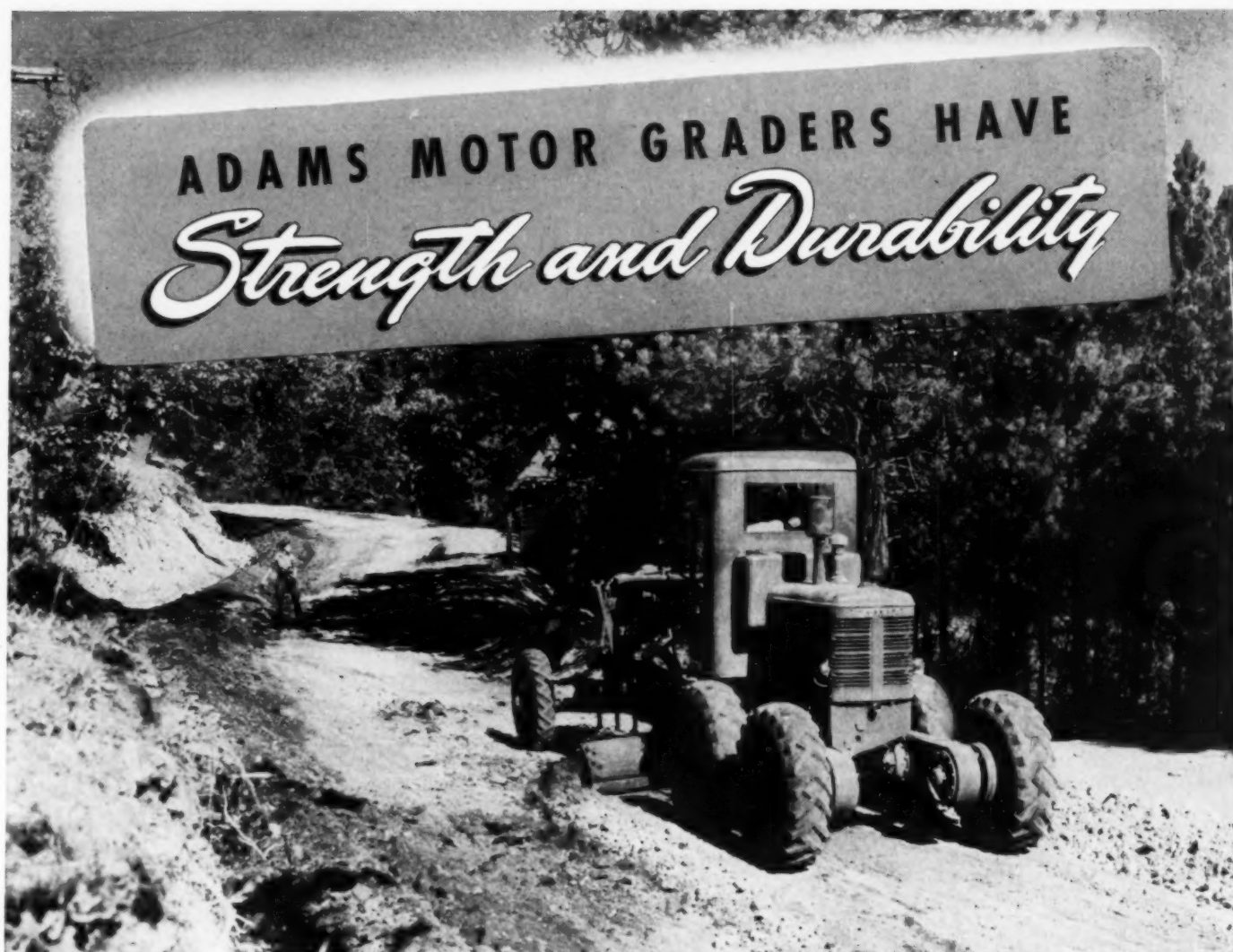
oils and caked-on greases. Formulation of Penetone is such that by rapid emulsification and ability to decrease surface tension, oil, grease and adhering dirt are quickly loosened and removed. Recommended that small metal parts be placed in bath consisting of solution of one part of Penetone to ten parts of water. In case of large parts grease may be removed by wiping with rags moistened with diluted solution. These products are also recommended for cleaning floors under machinery, as well as garage and grease rack floors, chassis and wheels of trucks and automobiles.—**The Penetone Co., Tenafly, N. J.**

★ ★ ★

PORTABLE BATCHING PLANT, called "Porto-Batcher," for use on highways has following advantages: (1) eliminates certain handling units; (2) reduces number of mixing units per concrete yard miles. May be towed behind truck on its own pneumatic tired wheels to most advantageous point in pouring area and is quickly set up for operation. Unusual feature: Johnson charging skip provides proper intermingling of aggregate with cement when discharged into mixer, assuring pre-mixing and pre-shrinkage which is said to compare favorably with best results of stationary batching plants. Cement does not touch wet mixer opening and walls, thus eliminating gumming and excessive wear. Skip's capacity is 43 cu. ft.—33 cu. ft. for aggregate and 10 cu. ft. for cement. Aggregate from three storage compartments reaches skip through three fill valves. Cement and each size



aggregate are weighed on separate weight beam. Cement compartment is completely sealed to avoid contact of cement with wet aggregate. One-man control of all batching operations by grouping of all levers in one central location. Batching cycle, 90 sec.—**C. S. Johnson Co., Champaign, Ill.**



One of a series of ads on Adams motor grader features

★ CARVING ROADS out of mountain sides—punching shale out of banks—making heavy ditch cuts—scarifying hard surface material—bucking heavy snow drifts—these are everyday operations for many Adams motor graders. It's work that demands strength to withstand heavy shocks and stresses. It requires durability if the machines are to stand up under punishment day after day.

Adams motor graders have that strength and durability. They get it, not through sheer bulk and weight of materials, but through painstaking engineering—engineering which is focused

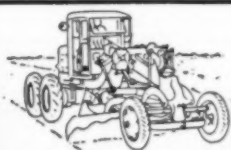
always on obtaining strength without excessive weight, because unnecessary weight is a liability in any machine.

Their long life, their ease and economy of operation, their wide adaptability to all kinds of work will make Adams motor graders your best buy when again you can purchase new machines. In the meantime, use the services of your local Adams dealer to keep your present equipment rolling.



J. D. ADAMS COMPANY • INDIANAPOLIS, IND.

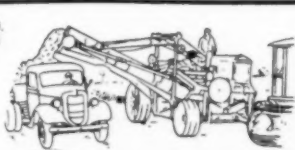
Granted a second Army-Navy Production Award for continued proficiency in the production of grading machinery for our armed forces



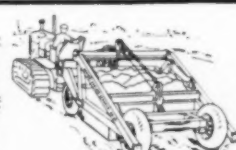
MOTOR GRADERS



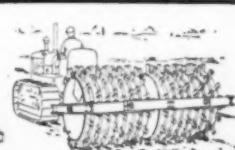
PULL-TYPE GRADERS



ELEVATING GRADERS



HAULING SCRAPERS



TAMPING ROLLERS

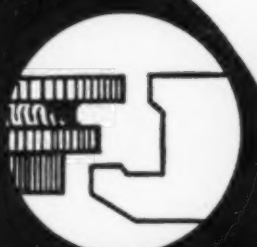
ADAMS

★ ROAD-BUILDING AND ★
EARTH-MOVING EQUIPMENT

For Air Economy USE *Thor* ROCK DRILLS

AIR INPUT Measured
to .00025 of an inch for
Balanced Power and
Smooth Performance.

Spaces between the flanges and chest
shoulders of this patented Thor Valve
are controlled to a tolerance of .00025
of an inch to turn into power All air
that enters the tool.



• Thor Rock Drills develop rock-smashing power and speed from every ounce of air that enters the machine through the patented Thor Positive Short-Travel Tubular Valve which controls air power by tolerances of .00025 of an inch!

Balanced power is one feature of such fine control—because only a precisely governed quantity of air is allowed behind the piston.

Smooth performance is another feature—because every stroke is powered by the same measured quantity of air.

And *air economy* is assured throughout the life of the Thor Rock Drill—because there are no separate parts of this patented Thor valve to lose or wear.

Thor Rock Drills offer many more features of design and construction—features providing complete control of drilling speeds, assuring dependable rotation, preventing clogging, and absorbing shock. For complete details about Thor Rock Drills and a wide range of associated air tools write today for Thor Catalog 42-A.

OTHER THOR AIR TOOLS
PAVING BREAKERS • CLAY
DIGGERS • TAMPERS • SUMP
PUMPS • GRINDERS • SAWS

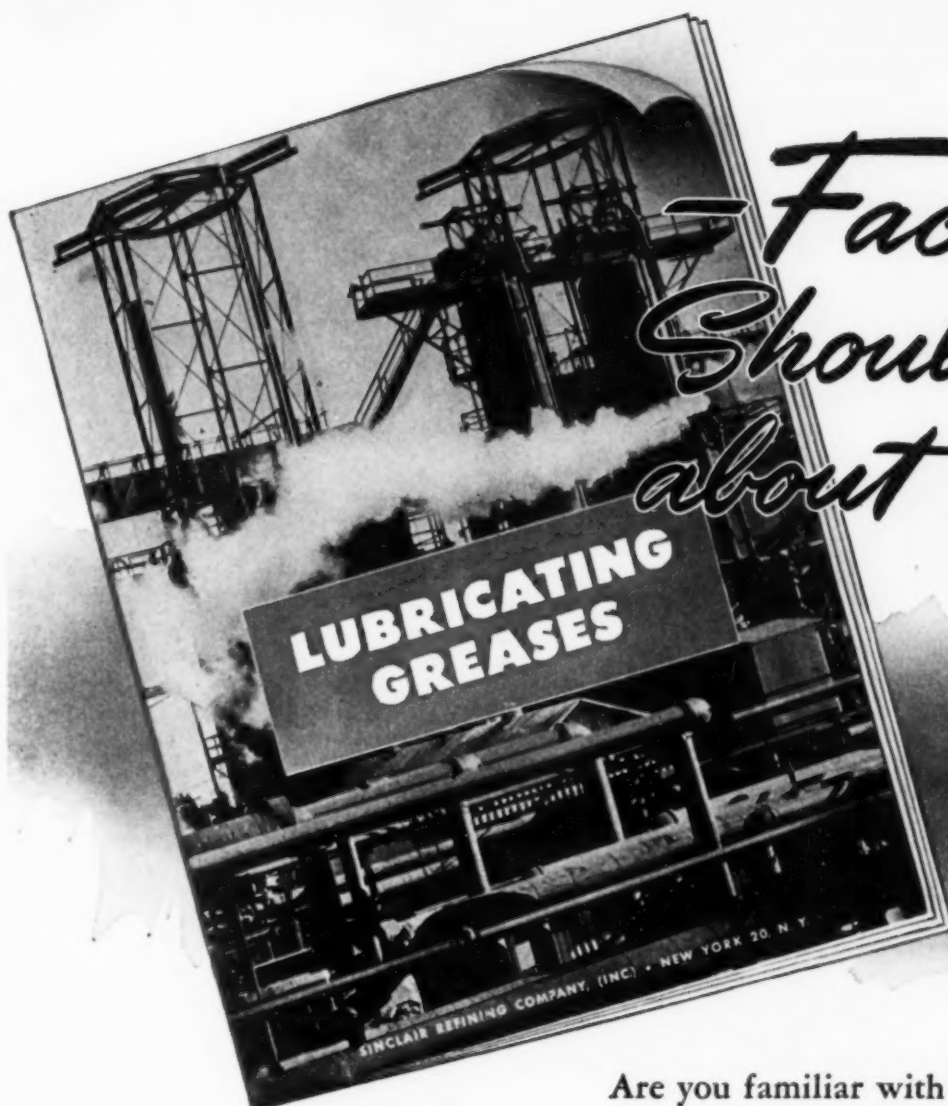
Thor

Portable Pneumatic and Electric Tools

INDEPENDENT PNEUMATIC TOOL COMPANY



600 W. JACKSON BOULEVARD, CHICAGO 6, ILL.
Branches in Principal Cities



Facts You Should Know about Greases

Are you familiar with the composition of lubricating greases? Do you know the different grease types . . . their virtues . . . their weaknesses? Are you informed about proper selection and correct application?

This and other information, vital to every industry, is contained in "Lubricating Greases," a new Sinclair brochure published by America's outstanding manufacturer of lubricants.

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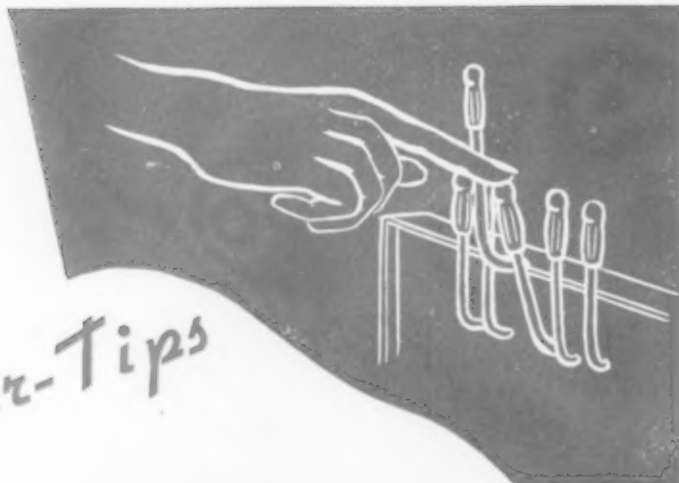
in individual machine or complete plant operation.

If you are interested in more efficient, more economical lubrication with a greatly reduced inventory of greases you will want a copy of "Lubricating Greases." Write today for a copy—with our compliments.

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At
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THE FAST, POSITIVE OPERATION OF WARCO'S HYDRAULIC CONTROL ROAD MACHINERY



Buy
Extra
War
Bonds

On WARCO Motor Graders the Hydraulic Controls work as simply as throwing a light switch, releasing tremendous power for easy, accurate operation. Watch these machines. They're going places.

Buy
only
what
you
need



WARCO-DUPLEX Hydraulic Scoops have everything—simple design and construction, flexible action; easy loading; controlled rear spreading; smoothly maneuverable. When the time comes to buy, consider this fine line.

**W.A. RIDDELL
CORPORATION**
Bucyrus, Ohio

Now available only on WPB release or approval — but ready for postwar construction.

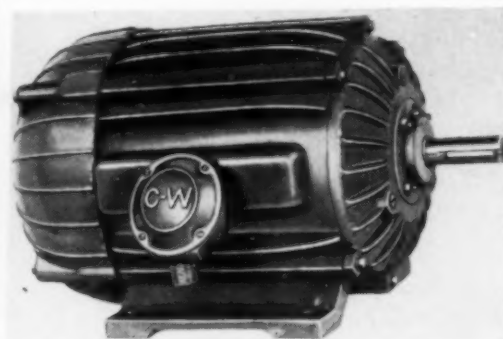
ENGINE-DRIVEN WELDER. lightweight "Shield-Arc" model has rating of 200 amp. and is powered by rubber-mounted 29 hp. engine. Supplied complete with base and canopy, this unit has current range of 40 to 250 amp. Dual control of welding current is accomplished by adjustment of series



fields and generator speed. For metallic arc welding with bare and coated electrodes, new model also supplies uniform welding current for carbon arc welding. Generator control or "job selector" assures accuracy of open circuit voltage and permits precise control of engine speed of from 1,500 to 1,150 rpm. for welding. In addition, this control may be used to reduce manually engine speed to as low as 750 rpm. whenever it is necessary to stop welding at intervals of a few minutes. This feature not only permits adjustment of engine speed to fit individual job, but also assures improved welding and keeps down fuel consumption and engine wear. Engine speed of from 1,150 to 1,400 rpm. is used for majority of welding applications. Generator can produce its rated current of 200 amp. when "job selector" is set so that machine operates at speeds as low as 1,200 rpm. Weight, 1,130 lb.; overall length, 65¼ in.; width, 24 in.; height 41½ in.—The Lincoln Electric Co., Cleveland, Ohio.

★ ★ ★

CORROSION RESISTANT MOTOR. 1 to 15 hp., is suitable for operation in atmospheres containing injurious dusts, corrosive vapors or gasses and excessive moisture. Totally inclosed and fan-



cooled. No cooling ducts to become fouled with wet or sticky dusts. All exposed parts acid and alkaline resistant to high degree. In addition to mechanical sealing of entire motor, each coil is individually sealed against moisture, fumes, vapor and dust by vacuum impregnation process.—Crocker-Wheeler Division, Joshua Hendy Iron Works, Ampere, N. J.

ADAK'S Tough clay can't stop 'em!

Yes, Northwests are working alongside the Marines on America's far flung battle lines, but that is not the point. The real point is that, whether they are in the tough, stiff clay of "Adak" or the hard rock of "Shipshaw", Northwest shovels, cranes and draglines are establishing an unequalled reputation for dependability, low cost operation and high output. • They are doing the kind of job that you are going to want done on post war contracts. • On the jobs you are on, watch the Northwests at work—ask how the Northwests are doing! • We'll be glad to help you with information for your future plans.

NORTHWEST ENGINEERING CO.
1720 Stager Building Chicago 4, Illinois 26 E. Jackson Boulevard



*ASK how
the
NORTHWESTS
are doing!*



*-and
when you have
a real Rock Shovel
you won't have
to worry about
output in dirt*

NORTHWEST

SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

A Generation on the Job— Amsco Dippers at Panama

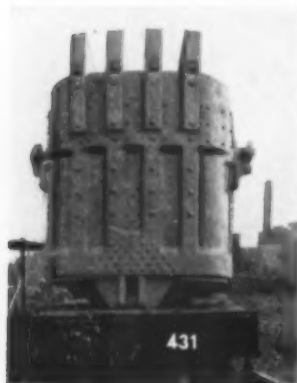
Amsco manganese steel dippers have been used at Panama since 1914 and have played an important part in keeping the "big ditch" open. Those employed 30 years ago were the Missabe type, like the 10 yard bucket shown in picture 431. Its design and the toughness of austenitic manganese steel made the Missabe such a big advance over any previous dipper that it is still used in some fields, despite the major improvements which have since been made in Amsco dipper design.

Today Amsco renewable lip dippers are on the job in the Canal Zone. Picture 1223 shows a 3½ yd. renewable lip dipper on a Lima shovel owned by the Martin Wunderlich and Okes Construction Companies, contractors. This shovel is shown dig-

ging in on the third locks job at Gatun. Before this job is completed, 12,000,000 yards of dirt and rock will have been moved.

No matter what the nature of the material handled, Amsco dippers, being made of "the toughest steel known," resist impact and abrasion longer than dippers made of other steels. The design of the renewable lip dipper, shown in picture R-619, contributes rapid, full loading and clean dumping. The smooth interior obviates clay building or arching of material. The lips and teeth are shaped for fast, clean cutting. The lip, which receives the brunt of the wear, is readily renewable.

Ask for Bulletins 641-D and 641-S on Amsco power shovel dippers and power-shovel parts.



Amsco
AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Illinois
FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO.
OFFICES IN PRINCIPAL CITIES

AMERICAN
Brake Shoe
COMPANY

PORTABLE TENSILE TESTER is said to obtain simply and economically required control data for tensile, compression, transverse or shearing tests. Brazed joints, spot welds standard rounds or flats and springs may be rapidly analyzed for relative strength. Starts at 0-250 lb. and has seven inter-



mediate and interchangeable indicators up to 0-10,000 lb. Weight, 132 lb. Height, 35 in. New holder-design for standard V-wedge serrated grips, aids in handling of loads and grips themselves permit especially rapid specimen insertions and removal by raising or lowering outer holder supports. Although hand-driven, machine may be motorized, a metal floor cabinet being supplied for this purpose, if desired.—W. C. Dillon & Co., Inc., 5410 W. Harrison St., Chicago, 44, Ill.

For a
**"GOOD
BUY" in
SHOVELS**

Ask for
**The ONLY
SHOVELS**
with
BLADE EDGES

GUARANTEED SPLIT-PROOF

INGERSOLL SHOVELS
"The Borg-Warner Line"

Write for Catalog and Prices
INGERSOLL STEEL & DISC DIVISION
BORG-WARNER CORPORATION
New Castle, Indiana
Plants: New Castle, Ind.; Chicago, Ill.; Kalamazoo, Mich.



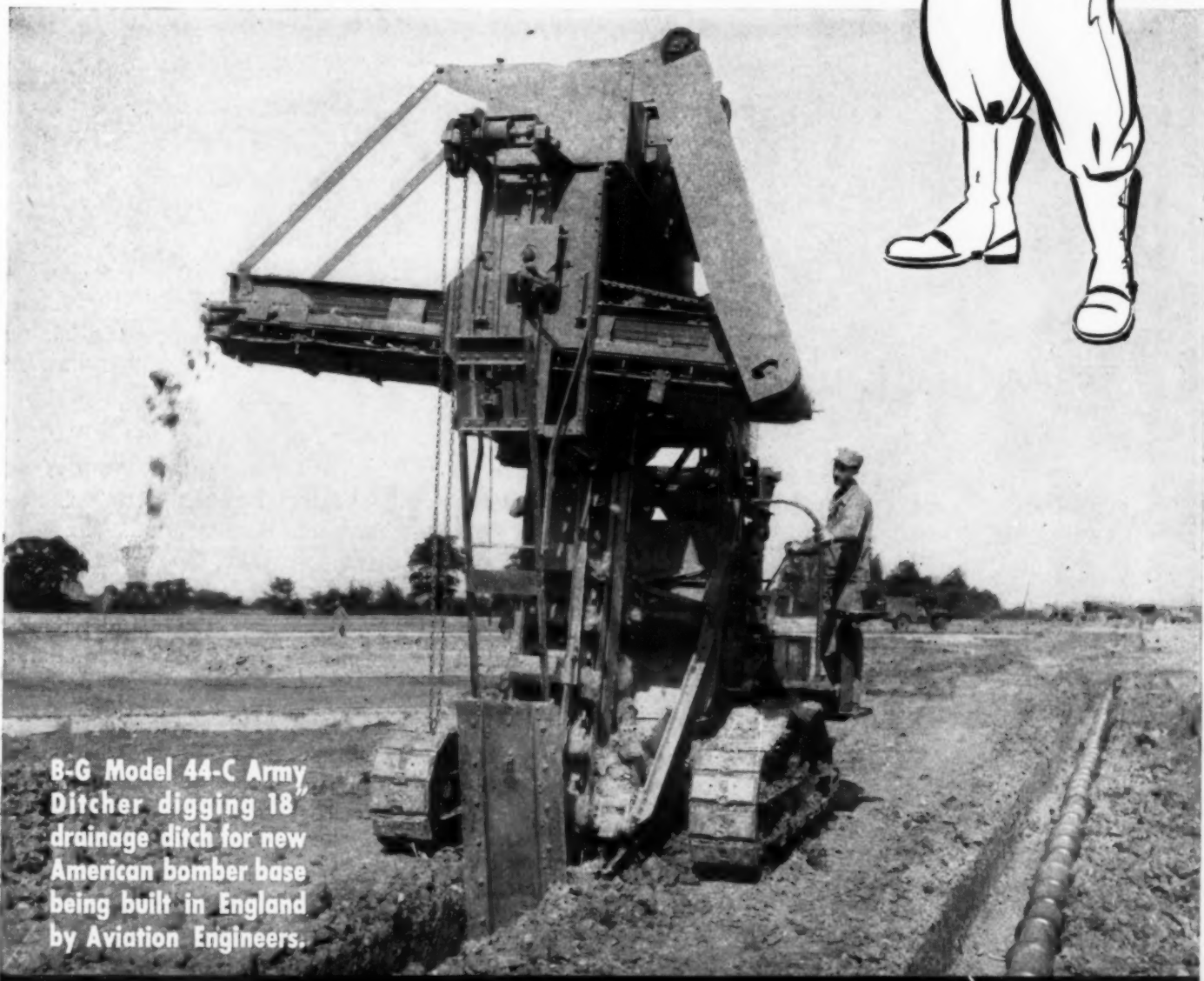
"jest ain't the same war"

That squad of pick and shovel experts of World War I isn't around for this War. Instead, there is a squad of B-G Ditchers digging faster and twenty hours a day.

Yes sir, it's a different war. Eight-foot trenches or two-foot drains, clay or rocks, it's all the same—the old shovel squad is mechanized. Better ditches, too, smooth sidewalls and straight as a bazooka barrel. Digging trenches in this war is as easy as chauffering for the general. Write for B-G Catalog 44.



44-5



B-G Model 44-C Army Ditcher digging 18" drainage ditch for new American bomber base being built in England by Aviation Engineers.

BARBER GREENE
AURORA, ILL.



Old "Forty Per Cent" Has Been a Good Handyman...

But..

For years, many a blaster has depended on "Old Forty Per Cent" dynamite for the job, regardless of conditions involved—with the old reliable handy, no need to monkey with new-fangled dynamite. "Old Forty Per Cent" has turned in a reasonably satisfactory performance, too.

But like all handymen, "Old Forty Per Cent" does not always measure up to the job. Special conditions call for special qualities that the old handyman dynamite does not possess. The blaster needs the right explosive and the right method to do the job right.

***Synergism**—a growing habit in American industry. Men bring problems and ideas together so that minds "click" to produce a result far greater than the sum of ideas expressed. So to speak, they make 2 plus 2 equal 5.

After all, explosives are tools of production. As in any precision operation, the right tool must be used in the right way to achieve the best results. Blasters are learning that blind dependence on "Old Forty Per Cent" is not necessarily the way either to get the best blasting result or the lowest costs of operation.

To insure the right explosive for the job, Atlas provides more than one-hundred and twenty grades and types of explosives in over 300 sizes to choose from. And Atlas representatives always are ready to apply synergistic* thinking to your blasting problems to produce better results at lower costs. Consult us.

ATLAS

EXPLOSIVES
"Everything for Blasting"



ATLAS POWDER COMPANY, Wilmington 99, Del. • Offices in principal cities • Cable Address—Atpowco

EXTRA PERFORMANCE
to do the Tough Job BETTER

EXTRA STAMINA
to Stay on The Job LONGER



ON TOUGH JOBS, like off-the-highway construction, strip mining and quarrying, tire value can be summed up in two words—*performance* and *stamina*. Wherever this work is done, you will find Firestone Rock Grip Tires on the job—*doing a job*.

They *give extra performance* because the deep chevron-type tread takes hold with a firm, positive grip. They *last* because the tread is tough; because the body is made of *gum-dipped* cord of high tensile strength; because there are four *extra* plies under the tread. And for extra strength, the sidewalls are "double thick."

These and Firestone's years of experience and "know-how" in building off-the-road tires give you the *extra* performance, the *extra* stamina you need today.

Listen to the Voice of Firestone with Richard Crooks and the Firestone Symphony Orchestra, under the direction of Howard Barlow, Monday evenings, over N. B. C.

Firestone
OFF-THE-ROAD TIRES

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March 1944 — CONSTRUCTION METHODS — Page 101

HEAT

CLINIC IN ACTION!

...THESE MEN
ARE DECIDING
HOW MUCH—FROM
HOW LITTLE



THE engineers shown above are carrying on exacting tests to see how much usable heat they can squeeze from the least amount of fuel-oil—what's known in technical language as "efficiency."

The machine being tested is a Cleaver-Brooks steam generator, but all types of Cleaver-Brooks equipment are subjected to exhaustive analysis and test—in the laboratory and the field under actual "job" conditions.

Research is a constant activity at Cleaver-Brooks, recognizing that war's end will set in action a nation-wide job of road construction and rehabilitation.

Time and cost-saving machines will enable you to handle more jobs with more profit. Be ready—be competitively equipped—to get your full share of the work.

Write today for full information on Cleaver-Brooks Tank

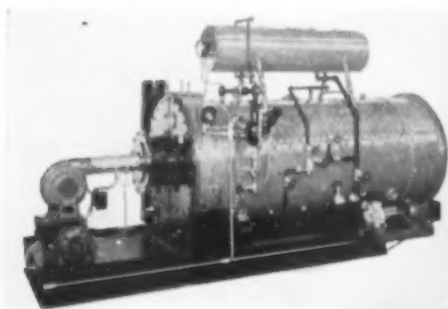
Car Heaters and Bituminous Boosters. Get the complete facts on their high speed low cost performance—heating road oils and bituminous materials to application temperatures. Learn why the original and exclusive Cleaver-Brooks four-pass down-draft flue travel and integral burner construction, plus the positive dry-coil method of condensate return, provides unsurpassed speed and economy.

Cleaver-Brooks Tank Car Heaters are built in two and three tank car sizes—Portable Pumping Boosters in two capacity sizes, with truck mounting or 4-wheel trailer.

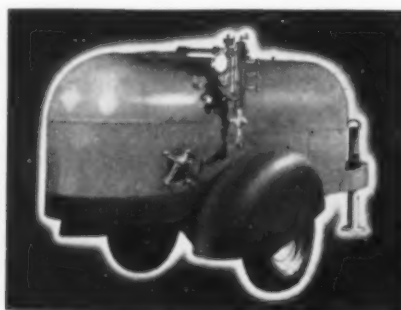
*Send for bulletins or see your
Cleaver-Brooks distributor*

CLEAVER - BROOKS COMPANY

5125 North 33rd Street • Milwaukee 9, Wisconsin



Cleaver-Brooks oil-fired automatic steam plants—available in 8 capacity sizes up to 100 H. P., working pressures to 200 lbs. Requires only simple field connections to place in operation.



Cleaver-Brooks Portable Tank Car Heater—a high pressure, oil-fired, compact mobile heater, available in two and three tank car sizes.



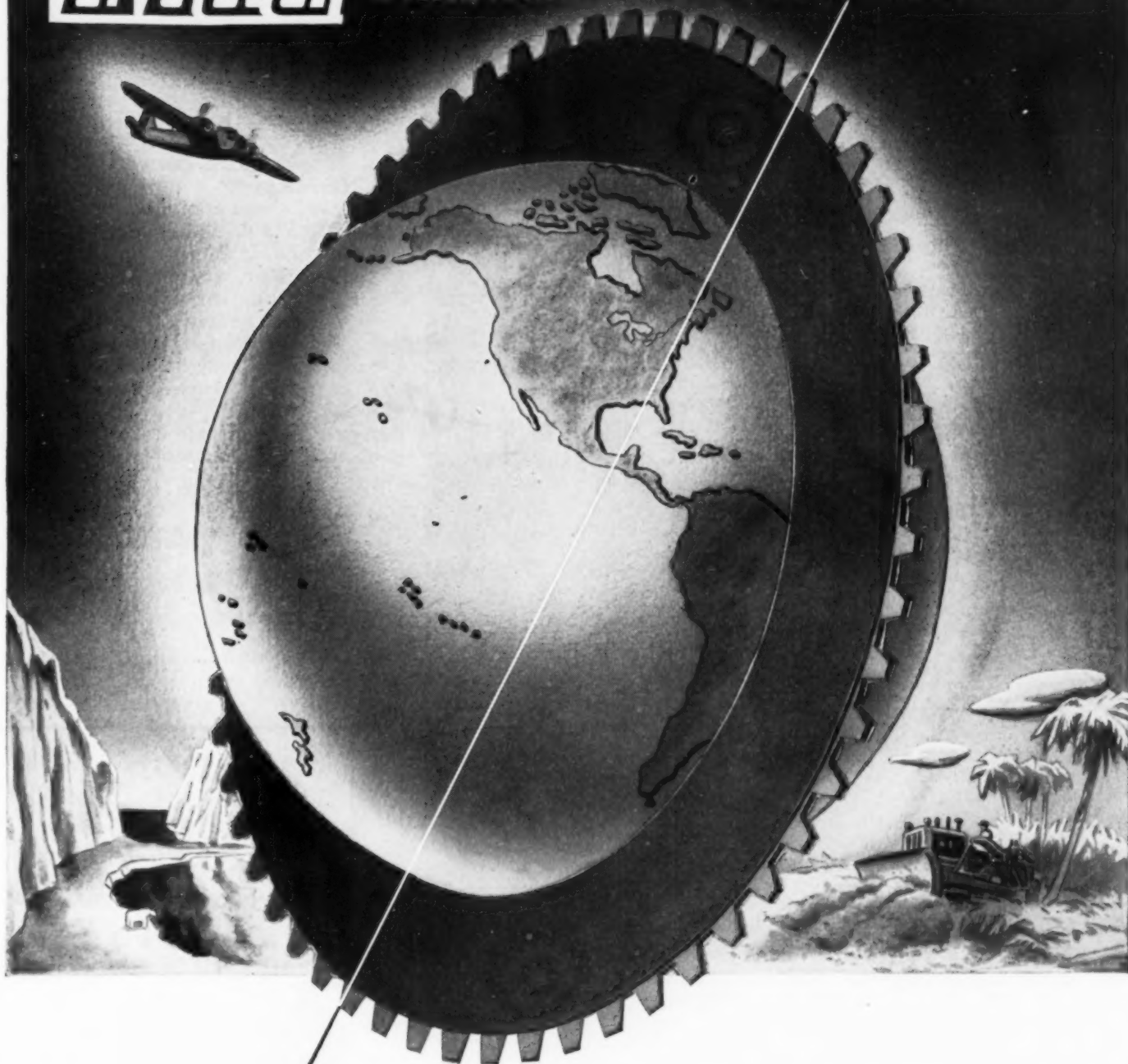
Truck-Mounted Cleaver-Brooks Portable Pumping Booster used in airport, flight strip, and road construction.

Cleaver-Brooks



TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . . AUTOMATIC STEAM PLANTS

Velvetouch BIMETALLIC FRICTION MATERIAL



*A scientific combination
of Powdered Metals for
brakes and clutches.*

AROUND THE GLOBE..

Velvetouch is meeting
rigid industrial and
military requirements

THE S. K. WELLMAN CO.
1374 East 51st St., Cleveland, Ohio
*Pioneers in putting Powder Metallurgy
to work for Industry*

"CLEVELANDS"

**Tops In Ditching
Machine Value
ALWAYS!**



THE CLEVELAND TRENCHER COMPANY
20100 ST. CLAIR AVE. "Pioneer of the Small Trencher" CLEVELAND 17, OHIO
"CLEVELANDS" Save More... Because they Do More

LEGAL ADVENTURES

(Continued from page 73)

"Yes, that's true."

"Well, then, why isn't it a check, when it's signed by the customer?"

"It's certainly a new one on me, but I'll pay it, and take a chance," the teller agreed, and the Supreme Court of Arkansas upheld him in a case reported in 229 S.W. 1026, where the court ruled that such a document fulfilled all the requirements of an actual check.

"The telegraphic message from the customer can only be treated either as a private direction from the former to the bank as his agent, or as the equivalent of a written check or order for the payment of money," was the reasoning of the Court.

★

More Legal Adventures of
Tractor Conn next month

National Carbide FLOODLIGHTS VALUABLE IN PEACETIME



**A
NECES-
SITY
NOW!**

**FOR ALL PURPOSES
WHERE FLOODLIGHTS
ARE REQUIRED.**

**Simple in Construction
Economical in Cost
Dependable in Operation**

**Available in 1500,
8,000 and 16,000
candlepower units.**

*Write today for literature
showing entire
lines of Floodlights
and Lanterns.*

**NATIONAL
CARBIDE CORP.
60 East 42nd Street
New York 17, N. Y.**

NC 200



BE READY—

The construction industry has met the unprecedented requirements of war. Now it is prepared to serve the peace with renewed experience and vigor.

The contractors of America are ready to fulfill the gigantic demands of those who look to the construction industry to supply the mounting need for private and public postwar construction.

But, planning must precede modernization, conversion and new construction well in advance of ground breaking. The time to plan is now. **THIS IS BLUEPRINT TIME.** Call in your architect, engineers and general contractor, they can help you to **BE READY** for construction, with plans, specifications and reliable cost estimates.



THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA, INC.

NINETY CHAPTERS AND BRANCHES THROUGHOUT THE COUNTRY
NATIONAL HEADQUARTERS—MUNSEY BLDG., WASHINGTON, D. C.

SKILL, INTEGRITY AND RESPONSIBILITY IN THE CONSTRUCTION OF BUILDINGS, HIGHWAYS, RAILROADS AND PUBLIC WORKS



WELLMAN WILLIAMS TYPE BUCKETS

Williams Buckets have been famous for their many fine mechanical details for nearly 40 years. Since 1931, Williams Buckets have been built by Wellman.

WELDED CONSTRUCTION, featured in Wellman custom-built buckets, which made them so predominant in heavy duty steel mill service, is now applied to all

Wellman-Williams Buckets FOR LONGER SERVICE WITH LESS MAINTENANCE COST

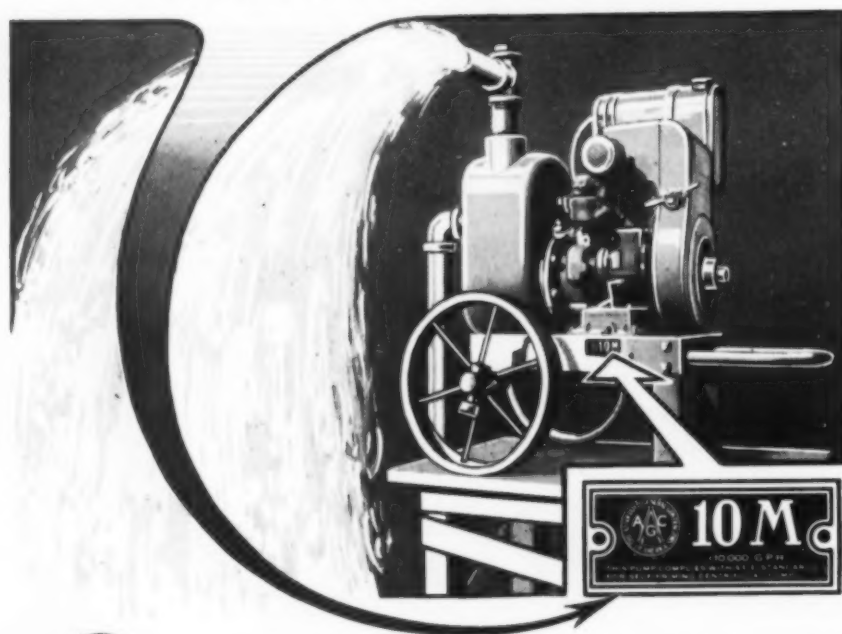
built in Multiple Rope, Power Arm, and Power Wheel Types in $\frac{3}{4}$ yd. to $16\frac{1}{2}$ yd. capacities.

SEND FOR FREE BULLETIN—Tell us about your particular requirement and we will send full description of construction and features in special bulletins which clearly prove why YOUR NEXT BUCKET SHOULD BE A WELLMAN.

THE WELLMAN ENGINEERING CO.
7017 Central Avenue
Cleveland 4, Ohio
Sales and Service Agencies in principal cities.



PROTECT YOURSELF



You cannot afford to take chances when buying a pump. Look for the AGC rating plate before you buy. The rating plate is your guarantee that the pump will deliver its full rated capacity.

CONTRACTORS PUMP BUREAU

BARNES MANUFACTURING CO.
Mansfield, Ohio
CONSTRUCTION MACHINERY CO.
Waterloo, Iowa
MARLOW PUMPS
Ridgewood, N. J.

C. H. & E. MANUFACTURING CO.
Milwaukee, Wis.
THE GORMAN-RUPP CO.
Mansfield, Ohio
NOVO ENGINE CO.
Lansing, Mich.

CHAIN BELT COMPANY
Milwaukee, Wis.
JAEGER MACHINE CO.
Columbus, Ohio
STERLING MACHINERY CORP.
Kansas City, Mo.

THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA, INC.

NEWS FROM MANUFACTURERS

About Their Products

The publications reviewed below, will keep you posted on latest developments in construction equipment and materials available for your use.



WAR-TIME TOOL MAINTENANCE — Skilsaw, Inc., 5033

Elston Ave., Chicago, 30, Ill. (40 pp. illustrated) How to Get the Most From Your Portable Electric Tools is the title of one section of this new catalog which has been designed as a guide to greater production and longer tool life. Full of illustrations and suggestions on care and operation of portable electric tools. Also carries complete data on and working illustrations of Skilsaw portable electric tools preferred in war production and construction. Of especial interest to engineers, production men and maintenance men.

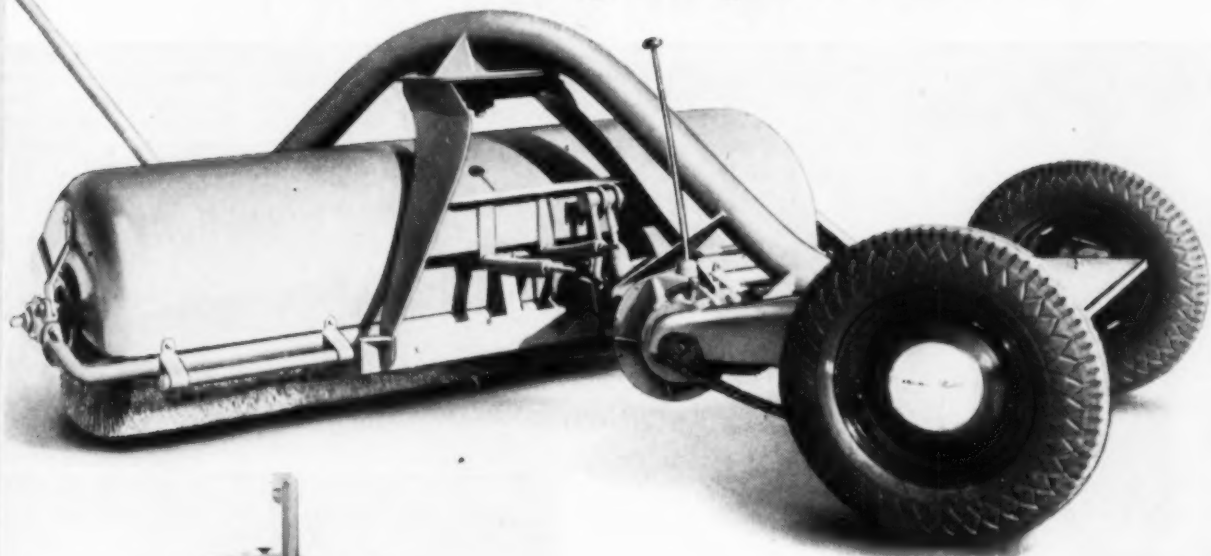
★ ★ ★

TRACTOR-SHOVEL—Frank G. Hough Co., Libertyville, Ill. (4-p. folder, illustrated) Describes Model HL 1-cu.yd. unit known as the "Payloador" claimed by its makers to be ideal for material handling or construction work at airports, army camps, ordnance plants, public utilities, municipalities, highways and all commercial plants where bulk material must be loaded, moved or handled on a production basis. Tractor said to be exceptionally versatile; properly balanced, powered on large rear wheels, a rugged digger and fast loader. Many of the jobs it is designed to do are illustrated in this folder.

★ ★ ★

CARE AND REPAIR OF BOLT AND WIRE CUTTERS—H. K. Porter, Inc., Everett, Mass. (48 pp., illustrated) Object of this manual is to show users of Porter bolt clippers how to get best results and longest possible service from these tools for the duration—and after. Subjects discussed: Right tool for the job; how to choose the correct type and temper; correct cutting technique; lubrication; adjustment of cutting edges; dressing cutting jaws; repair of cutterheads; repair of handles; replacement of adjusting section; reassembling tool; converting to swivel type; repair parts and how to order them; how to use the cold chisel; general hints on hand filing; how to use the ball peen hammer; about hack saw blades; preventing breakage of drills and taps; suggestions for lip or cutting angles on high speed bits for tool holders.

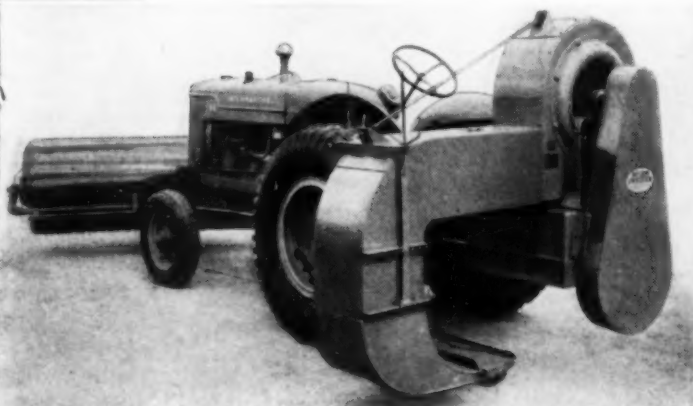
***There's a HOUGH SWEEPER
for every requirement***



Hough Model "B" Universal Road Sweeper. A heavy duty, engine-driven machine with a sweeping path of 72". Two direction brush sweeps to either right or left, at adjustable speed.



Hough Tractor Sweeper. A power-driven rotary broom mounted on a small tractor; making an efficient unit for general sweeping and snow removal.



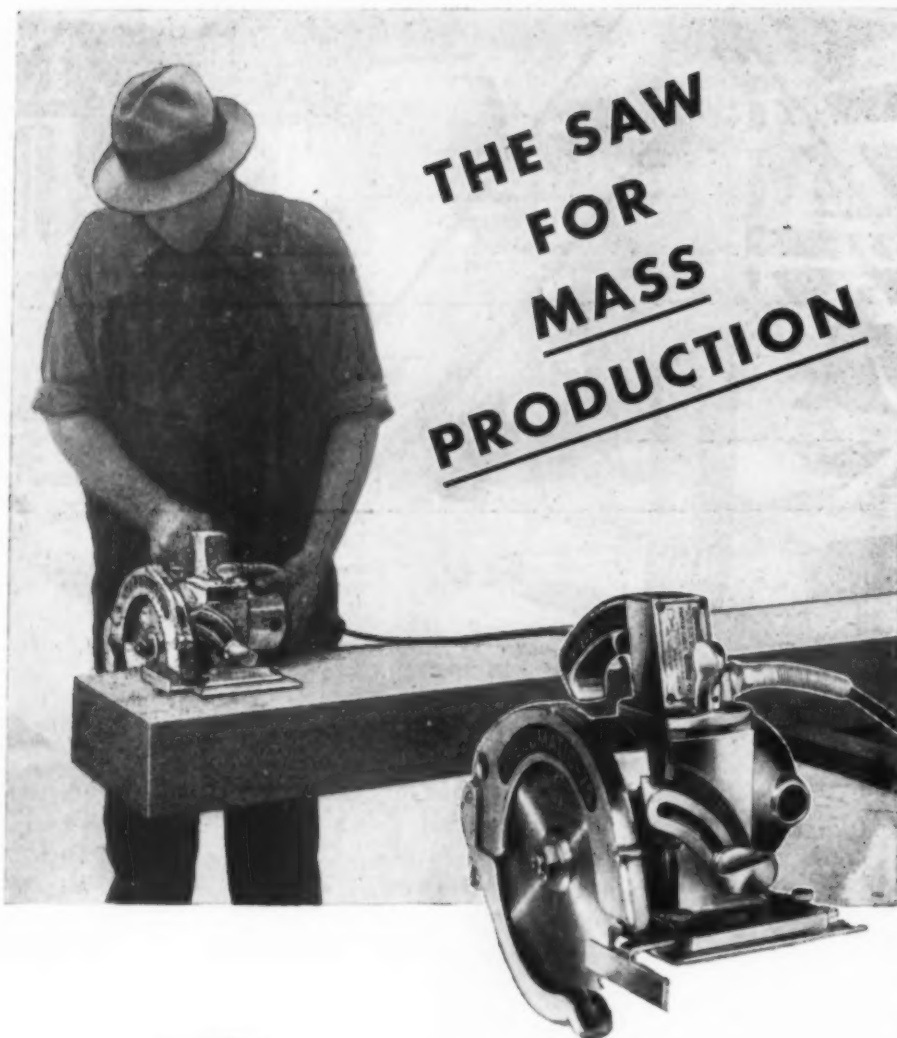
Hough Combination Tractor Sweeper-Blower. A low cost complete unit with a 6' sweeping path. Sweeper readily detached. Ideal for removing dust and fines from old surfaces before prime or seal coating.

Types for every municipal, county, state and airport need and for road builders and contractors. Universal Tu-way traction powered units like the one above for use with trucks and tractors, Universal engine-driven units and units for attachment to the front end of wheeled tractors. Also sweeper-blower combinations. Provide effective removal of snow, dirt and debris.

THE FRANK G. HOUGH CO.
Libertyville, Illinois



HOUGH
"HUFF"
Tractor Shovels
Road Sweepers



*Speed*matic

built to take the IRK out of heavy work

Of course, Porter-Cable SPEEDMATICS, used in place of hand-saws can do the usual run of jobs faster, more efficiently. But to realize the full possibilities of a SPEEDMATIC, plan the work so it will be kept cutting every minute of the day. You'll see the construction rate per man hit new highs when cutting is kept ahead of the time each piece is needed. You'll see, too, that SPEEDMATIC was designed to perform that kind of work — day-long cutting of 8 x 10's looks a lot easier with SPEEDMATIC.

SPEEDMATIC's inbuilt ruggedness comes from its oversize motor, and from the reliable helical gear drive that delivers 11% more usable power to the blade. The broad shoe sets it securely and safely, even when tilted to cut at an angle. Balanced grip makes it the only truly-one-hand saw. Available in 7½", 8", 10" and 12" sizes.

FREE DEMONSTRATION

Ask to see the SPEEDMATIC at work — then judge for yourself. There's no charge or obligation. Just phone your dealer or the local Porter-Cable representative (his name is in the classified 'phone book) or drop a postcard to us for full details.

**PORTER
-CABLE
MACHINE CO.**
1920-3 N. Salina Street
SYRACUSE 8, N. Y.

PROGRESS REPORT TO EXPORT FIELD—**R. G. LeTourneau, Inc.**, Peoria, Ill. (16 pp., illustrated) Two booklets, titled "A Report from R. G. LeTourneau, Inc. and Your LeTourneau Dealer", one in English and one in Spanish, have been issued to the entire export field by this company. Discuss LeTourneau's part in the war effort, whereabouts of LeTourneau export representatives, what equipment is now being made by the company, how it can be obtained, discussions and advice on job planning, correct operation, emergency repairs, Tournarope and Tournaweld and finally, comments on post-war export activities.

★ ★ ★

ENGINEERS IN ACTION

(Continued from page 72)

right time and in sufficient quantity. Both men and machines work three shifts around the clock.

Also there is the question of maintenance and repair of facilities that have been constructed; these include airfields,



MOTORIZED SHOP TRUCK performs essential service in maintaining and repairing construction equipment on New Georgia Island.

roads, ports and all manner of military installations and the utility systems that go with them.

Having but briefly reviewed the mission, the equipment, and the conditions under which it must be utilized to accomplish that mission, we must finally examine another element of utmost im-

(Continued on page 110)

GULF PRODUCTS help Hardaway Contracting Co. finish rush job ahead of schedule



Hardaway Contracting Company, Columbus, Georgia, averaged over 10,000 yards per day in grading the extension runways on this airport construction project. Gulf quality lubricants and fuels helped this contractor finish the job well ahead of schedule.



"The efficient and dependable performance of our equipment with Gulf Lubricants and Fuels was an important factor in our fast progress," says this contractor

GULF quality lubricants and fuels played a big part in our finishing up this rush airport job ahead of schedule," says Superintendent Roy Geise of Hardaway Contracting Co. "Gulf products contributed to the outstanding efficiency record of our equipment, and helped us avoid delays caused by mechanical troubles."

Here are some of the reasons why so many leading contractors rely on Gulf lubricants and fuels to help them beat contract schedules: Gulf lubricants have a performance-proven reputation for quality—they provide

the kind of lubrication that means full protection to equipment under punishing service conditions. And Gulf fuels deliver full power. Result: efficient operation of every unit, long service life, low maintenance costs, and a minimum of costly operating delays.

Call in a Gulf Service Engineer before you go to work on your next contract—let him show you how Gulf quality lubricants and fuels can help you do a speedier, more profitable job. Write, wire, or phone your nearest Gulf office today.

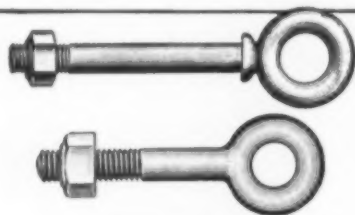


GULF OIL CORPORATION • GULF REFINING COMPANY • GULF BLDG., PITTSBURGH 30, PA.

HERE'S A LINK FREE FROM PLAY OR SHEARING ACTION ON THE RIVET

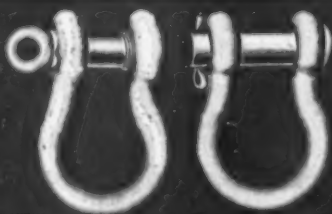


Laughlin's drop-forged, heat-treated "Missing Link" is matched under pressure . . . so there is no play between the halves, no shearing action on the rivet. Under stress, the rivet merely holds the missing link together. The interlocking lugs take the load.



WIDE RANGE OF EYE BOLTS

Laughlin's drop-forged, weldless eye bolts are available in any length or diameter, with or without thread or shoulder. Galvanized or Plain. Stock sizes: $\frac{1}{4}$ " x 2" to $1\frac{1}{4}$ " x 20".



SHACKLES MADE TO U. S. GOVERNMENT TOLERANCES

Drop-forged steel, weldless anchor shackles, made in all sizes from $\frac{3}{16}$ " to $2\frac{1}{2}$ ". Can be furnished with either screw pin, round pin or bolt and nut. Galvanized or Plain-finish.

Write for latest Catalog on
Laughlin Industrial Hardware

Distributed through
Mill, Mine, and Oil Field Supply Houses

FORGING A SHARE IN VICTORY

**THE THOMAS
LAUGHLIN Company**
PORTLAND, MAINE

TURNSUCKLE



ROPE SOCKET
(CLOSED PATTERN)



EYE HOOK



(Continued from page 108)

portance. That is the tremendous—yes, unbelievable—distances between the places you read about in the Pacific theaters of war.

What is the importance of these distances? Outside the fact that they represent the consumption of time—time which is ever operating to the advantage of the Japs—most of these points are separated from each other by water. Each time a new island or other objective is taken it must be within range of fighter-escorted bombers for air control. After we land and ultimately drive out the Japs, we must build all of these establishments over again—airfields, docks, roads, water points, storage space—before we can move against the next objective and each forward point must eventually be supplied by ships. All of these advance operations are subject to enemy action, which means sudden destruction in addition to the abnormal wear and tear already suffered by the equipment.

And so, there is no easy road to Tokyo. Furthermore, as was so tragically demonstrated at Tarawa, even these recently conquered outlying bases are unbelievably well-fortified. As we get nearer to

(Continued on page 112)



Fast Equipment Cleaning!

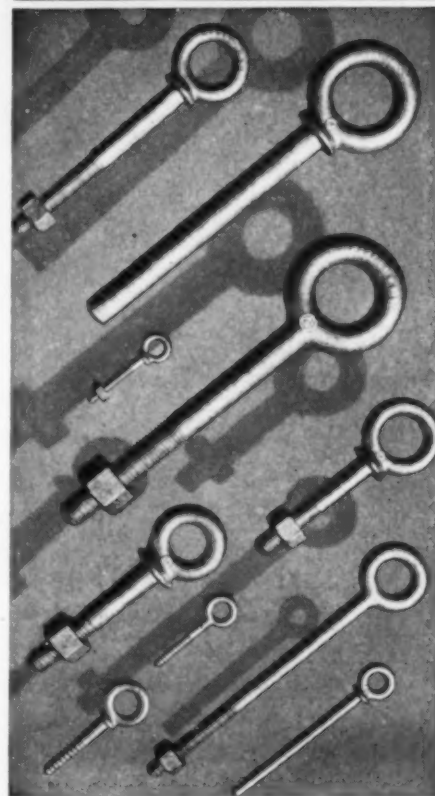
To quickly remove deposits of oil, grease and muck from road building and similar equipment, use fast Oakite steam-detergent cleaning or Oakite solvent-spray method. Overhaul and repair are speeded . . . equipment goes back in service with little delay. FREE 24-page booklet gives complete details. Write for YOUR copy TODAY!

24G OAKITE PRODUCTS, INC.
Thames Street, New York 6, N. Y.
Technical Service Representatives Located in All
Principal Cities of the United States and Canada

OAKITE
Specialized **CLEANING**

MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT

SPECIALS WASTE TIME ... TRY LAUGHLIN'S STANDARD LINE EYE BOLTS FOR ALL JOBS



Keep your eye on this picture if you're thinking of having special bolts made up. Every minute counts! Laughlin standard eye bolts will likely fill the bill. All weldless—all drop forged steel. Nut type with extra length threads for extra adjustment. Send for latest Laughlin Catalog showing standard stock eye bolt sizes in nut, screw and rivet types.

Distributed through
Mill, Mine, and Oil Field Supply Houses

Look for Laughlin Products in
Thomas Register

Write for latest Catalog on
Laughlin Industrial Hardware

FORGING A SHARE IN VICTORY

**THE THOMAS
LAUGHLIN Company**
PORTLAND, MAINE

TURNSUCKLE



ROPE SOCKET
(CLOSED PATTERN)



EYE HOOK





How to bid on Post-War Subdrains

New highways after the war will be built differently. If road builders profit by experiences with pre-war highway break-ups and airport runway troubles, the new roads will have dry, stable foundations.

That means adequate subdrains and more work for the contractor. Farm drainage methods and blind drains will not do. Modern roads will require designed subdrains consisting of: (1) a trench deep enough to intercept all the water before it

reaches the roadway, (2) a graded backfill (not too large) that will keep out silt, (3) a perforated corrugated metal pipe that resists impact, vibration and disjoints, and (4) an adequate outlet.

Because of the light weight, long

Installing 18,000 ft. of 8-in. ARMCO Hel-Cor Perforated Pipe on the new Philadelphia road in Cecil County, Md.

★ ★ ★

lengths, few joints, and absence of breakage of ARMCO Perforated Pipe, you can install it quicker and easier and can bid it at less cost per foot. You will like to handle this pipe, too, and your job will move along more smoothly. Ask for literature on designed subdrainage. Address: Armco Drainage Products Association, 165 Curtis Street, Middletown, Ohio.

*HELP FINISH THE FIGHT—
WITH WAR BONDS*



ARMCO Perforated Pipe



Clipper

MASONRY SAWS



A special shape or shorter length need only be as far away as your Clipper Masonry Saw. The basic feature of Clipper is the new multiple cutting principle... a method developed especially for Masonry Materials. You can be sure to cut with the fastest cutting speed and to obtain the longest blade life. Write for Catalog.

CLIPPER

MANUFACTURING CO.
4037 Manchester St. ST. LOUIS, MO.



(Continued from page 110)

the home islands of Japan, the difficulties will increase and the defenses will become more impregnable.

Of victory in the Pacific I am as certain as of victory in Europe. But, as the Secretary of War reminded us recently, we are only in the "drag" period of this war, following the "onset" and preceding the "finish." It is in this period,—the



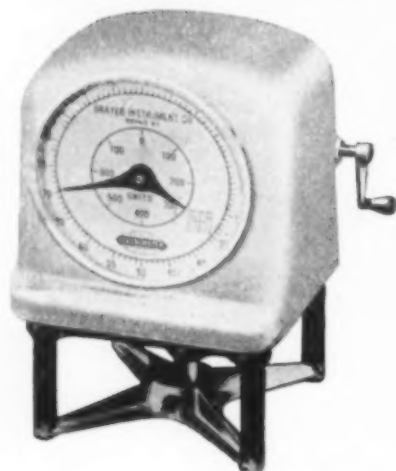
BROKEN CABLE DRUM of crane is repaired by welding with oxyacetylene torch at Engineer shop near Milne Bay, New Guinea.

Modernize Old Asphalt Plants

by installing the

Fluidometer

Automatic LIQUID METERING SYSTEM



★ ★ ★
Saves Time and Material—Insures Accuracy and Uniformity—Adaptable to All Types of Plants.

● The FLUIDOMETER is a simple, dependable, completely non-manual metering system which eliminates false tare, human errors, injuries and occupational disease hazards incidental to the handling of hot bituminous cement. With a Fluidometer, a push button replaces the weighing bucket routine. When the button is pushed, the Fluidometer delivers the predetermined quantity, then automatically resets for the next delivery. Or it may be operated automatically by the time lock. Paving mixtures are held to precise limits of uniformity—time and operating costs are saved. Accuracy proven in years of service. Adaptable to all types of plants. Write for descriptive literature. HETHERINGTON & BERNER INC., Indianapolis 7, Indiana.

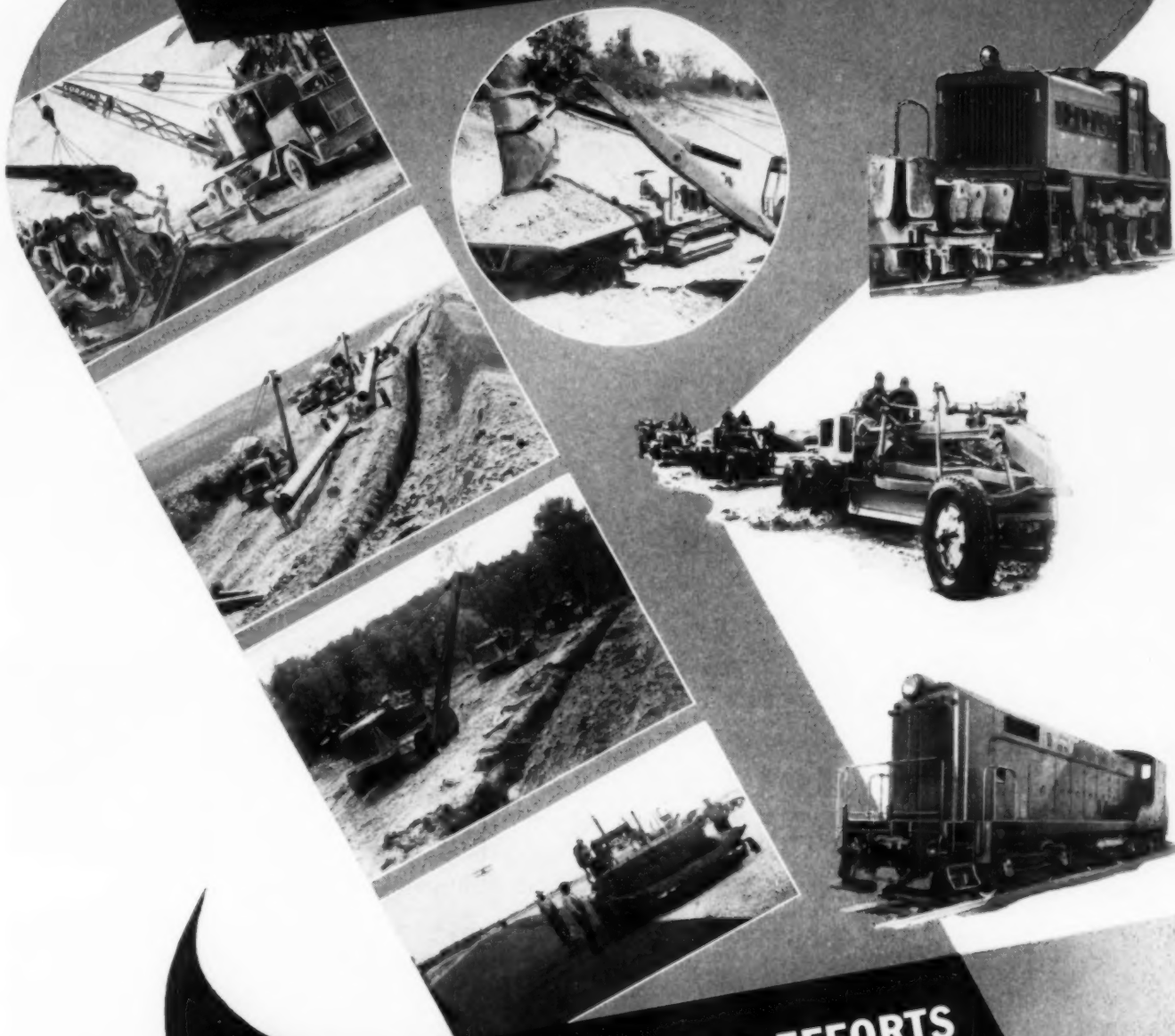
Hetherington & Berner



SUPPLY ROAD in New Georgia is graded by tractor-bulldozer unit.

drag—that we must fashion everything we have to support the hammer blows that will bring victory, and we must fortify ourselves as well against casualties—long lists of casualties—as we come to grips with both of our powerful enemies in large force.

STILL DOING THE TOUGH JOBS



SERVING IN ALL WAR EFFORTS

DIAMOND ROLLER CHAINS

Serving here and abroad,—construction machinery and equipment built by leading manufacturers are still doing the tough jobs. Such equipment in the hands of the Army, Navy and Marine engineers,—by the Seabees and other construction crews, have helped pave the way to Victory.

The drive chains used on these rugged machines must perform under all manner of circumstances—entail no unnecessary servicing or delays.

DIAMOND Roller Chain Drives have earned their place as the preferred drives

for such equipment through their past record of ruggedness, uniform quality, great reserve strength, long life and high efficiency. To provide performance plus, leading manufacturers regularly use DIAMOND Roller Chain Drives.

On the equipment you buy and for all replacements DIAMOND Drives will help you secure full production at all times. DIAMOND CHAIN & MFG. CO., 418 Kentucky Avenue, Indianapolis 7, Indiana. Offices and Distributors in All Principal Cities.



FOX HOLES, PIER HOLES, POST HOLES

is where the speedy

BUDA

EARTH DRILL

does the real work

FOR CLEAN, STRAIGHT HOLES
IN TOUGH SOIL — HARD EARTH OR ICE
USE THIS MODERN EQUIPMENT
TO SAVE TIME — LABOR AND MONEY.

BUDA

HARVEY (Chicago Suburb) ILLINOIS

Write or Wire for Bulletin.

Norfolk Dam

(Continued from page 87)

with wire leads extending to the inspection gallery in the dam, are installed in the monoliths at designated points to measure temperatures. Cooling is continued by water circulation through the coil at each level until the desired temperature is attained in the adjacent concrete. For the first lift on foundation rock, the cooling period in summer has ranged from 50 to 65 days. In higher lifts, the average time required in summer to obtain desired concrete temperature has been about 35 days.

After cooling has been completed, specifications require that the contractor fill the tubing with grout. Nipples providing connection to the tubing in the downstream face of the dam then are removed, and the holes are patched.

For the U. S. Engineers, Little Rock District, Capt. John L. Kemple is resident engineer in charge at the site of the Norfolk Dam project. C. B. (Woody) Williams, project manager, directs the work

(Continued on page 116)



When There's No Time for Breakdowns It's Time to Get a Gorman-Rupp Pump

Today, when time is the essence, you need a Gorman-Rupp Self-Priming Centrifugal Pump more than ever. There is not a quitter among them. The water passage has the same area as the suction hose. Muck, gravel, cinders — you simply can't clog them because solids cannot accumulate. There is no recirculation orifice to clog — no shut-off valve to jam — no hand priming regulator. There isn't a self-priming centrifugal pump made that will outwork a Gorman-Rupp in gallonage or continuous hours. Gas engine or electric motor driven. Capacities up to 125,000 GPH. There is a type and style to fit your every requirement. Stock for immediate delivery in 100 principal cities.

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Self-Priming Centrifugal Pumps

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Warm today—freezing tonight. That's the kind of weather that comes with the tag end of winter—and threatens concrete with damage by freezing.

That's why so many contractors use Lehigh Early Strength Cement for late winter and early spring construction. It saves time, money and expense. Concrete cures beyond the danger of frost damage *3 to 5 times faster* than when made with normal Portland cement. And reaches service strength in $\frac{1}{4}$ to $\frac{1}{3}$ the time taken by normal Portland cement!

So you are not only *safer*, but you *save* days and dollars through quicker removal and

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Lehigh's Service Department offers you, free, complete information on cold weather concrete. Write today and get the facts on the *savings* and *safety* of Lehigh Early Strength Cement!



LEHIGH EARLY STRENGTH CEMENT

for *service-strength* concrete in a *hurry*

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LUFKIN

SAGINAW, MICHIGAN • New York City
TAPES • RULES • PRECISION TOOLS

(Continued from page 114)

for The Utah Construction Co., Ogden, Utah, and Morrison-Knudsen Co., Inc., Boise, Idaho, contractors. Other men on the project for the U. S. Engineers and the contractors were named in an earlier article, CONSTRUCTION METHODS, October, 1943, p. 62.

...

The fifth article in this series on Norfolk Dam will appear in the April number.

★ ★ ★

Concrete Vibrators

(Continued from page 69)

earlier. There is danger to these bearings in the improper practice of operating the vibrator in some position above the horizontal. This tends to drive oil away from the wearing surfaces and if continued for several minutes may seriously damage bearings that otherwise would operate

(Continued on page 118)

SAVE TIME

WITH

COFFING'S "SAFETY-PULL" RATCHET LEVER HOIST

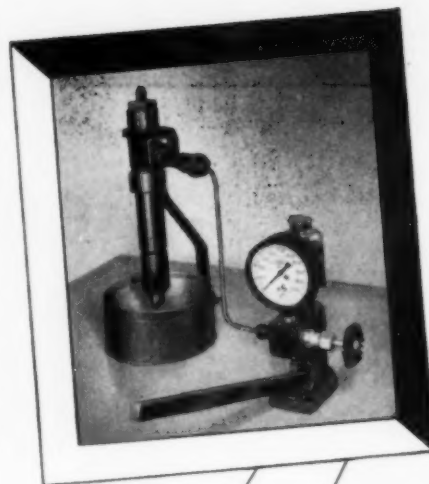


Hundreds of war plants are speeding production by equipping their maintenance and construction crews with "SAFETY-PULL" ratchet lever hoists. They can easily be carried about by one man,

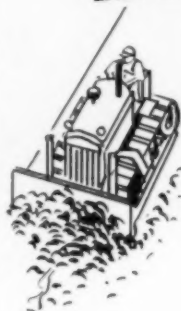
will operate in any position, and may be used for either pulling or lifting. A real tool for those inevitable maintenance jobs.

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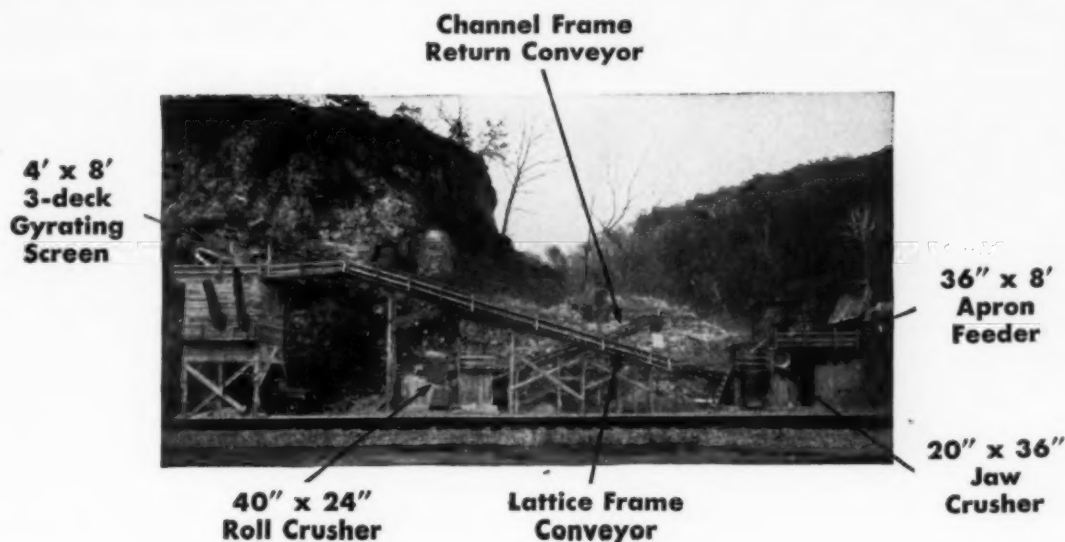


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1,000 TONS per DAY

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Over 100 tons per hour, 1,000 tons per day—day after day—of ballast, mostly $1\frac{1}{2}$ " and 1", are being turned out at minimum cost for the Burlington Railroad at Wyalusing, Wisc. This plant, one of a number owned by E. C. Schroeder of McGregor, Iowa, consists of 6 standard units selected as most suitable for this railside quarry. Timber was used wherever possible to conserve metal. Output is up to the expectations of all concerned.

This plant, made up of 6 "packaged" units and arranged to provide a minimum of handling, includes: a 20" x 36" roller bearing primary jaw crusher of Universal's exclusive

light-strong Streamlined design; a 40" x 24" roller bearing star gear roll crusher for secondary reduction; 4' x 8' three deck gyrating screen; a 36" x 8' apron feeder with bar grizzly and by-pass (to by-pass fines around primary crusher); a 24" x 108' lattice frame conveyor from primary crusher to screen; and an 18" x 44' channel frame return conveyor. This is another case where soundly engineered standard units of the proper size selected from Universal's complete line were brought together to form an efficient, profitable plant. Probably we can do the same for you.

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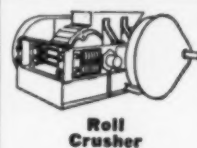
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CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS



Jaw Crusher



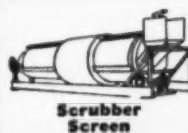
Roll Crusher



Gyrating Screen



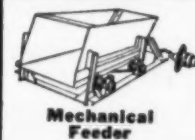
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Scrubber Screen



"Lattice" Conveyor



Mechanical Feeder



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Steel Bin



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ARCADE BUILDING

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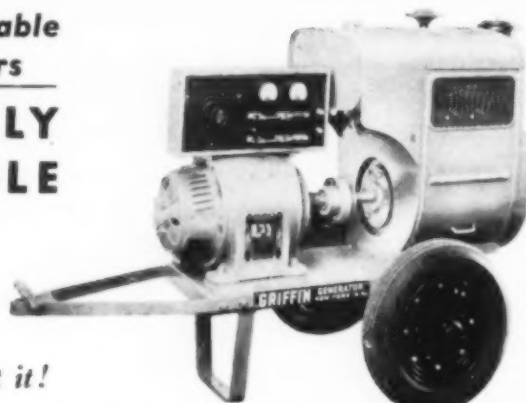
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Engineered and built to give you the same dependable Long Life as all Griffin products.



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GRIFFIN EQUIPMENT
and Supply Corporation

(Continued from page 116)
safely for many hours in the horizontal or downward inclined position.

Worn Housings Welded

The vibrator assembly housing is subjected to considerable wear because of impact against reinforcing steel in the concrete. After long service (usually after 8 or 9 of the 8- to 12-hr. operating periods) these housings may be worn to the danger point. Some have worn through. On the Belair job, when the danger point in metal thickness approaches, these housings are built up by welding to their outer surface a layer of stellite put on by an expert welder so that the new metal will be distributed as smoothly and evenly as possible.

To minimize distortion, the first two beads are laid on diametrically opposite lines parallel to the housing center line. The third and fourth beads, also diametrically opposed, are put in a plane at right angles to the first two beads. Then the coating is completed by beads placed in opposite quadrants successively, thus minimizing distortion. However, after a coating is welded on, the housing is always rebored to insure a true interior.

Placing the longitudinal beads, which heats the housing, sometimes leaves the threaded end slightly enlarged. To shrink the threads slightly it is customary to run a single circumferential bead around the outside of the threaded section.

The reboring (Fig. 4) is done on a lathe in which the housing is set up as the stationary part of the work, and the cutting tool is rotated by the chuck. The housing, with the vibrator assembly inserted in place, is set up on the lathe in a mounting that has four adjustments, thus enabling the stationary assembly to be exactly centered with respect to the chuck. When an exactly centered position of this stationary set-up has been accomplished, the vibrator assembly is slipped out of the housing, a boring tool is put into the chuck and reboring begins.

Special Switch

A switch similar to that used in the motor is now used in a mounting designed to be attached to the operator's belt, as shown in sketch. This expedient, the result of a suggestion originating in the shop, eliminates the need of the helper previously stationed at the motor to turn it on and off on signal from the operator. This improvement is estimated to save \$1,700 in labor on each concrete ship, in addition to saving in wear and increasing life of parts resultant from immediate shutoff when vibrator head comes out of the concrete.

The contract for building the 26 concrete barges under construction at Belair

(Continued on page 120)

MICHIGAN

can do

JOBS for YOU

1 CRANE

2 CLAM



3 SHOVEL

From Clamshell or Crane use, the $\frac{3}{8}$ yard and $\frac{1}{2}$ yard MICHIGANS can be quickly converted to shovel use by changing booms. Much time is saved because in the MICHIGAN, no changes are necessary in the operating mechanism. Full circle loading.



4 DRAGLINE

On the regular crane boom, the Michigan Dragline equipment can be rigged in an hour or less. An unusually long reach is possible with this attachment, and the high speed, AIR-CONTROLLED operation of all MICHIGANS means added work capacity.



5 TRENCH HOE

This attachment, with its eleven-foot digging depth, finds scores of uses in public works and private construction.

Trench Hoe is available for both $\frac{3}{8}$ yard and $\frac{1}{2}$ yard models, as are all attachments pictured here.



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 $\frac{1}{2}$ YARD BULLETIN CM34T
AND $\frac{3}{8}$ YARD BULLETIN CM34K

MICHIGAN

POWER SHOVEL CO.

BENTON HARBOR, MICHIGAN



"Duck Shooting" in Italy



Out of the invasion of Sicily and Italy have come many striking examples of the value and versatility of GMC Truck & Coach Division's 2½ ton Amphibian Truck. General Montgomery and his staff are reported to have ridden into Sicily in a "Duck." Both the British Eighth Army and American Fifth Army used them by the hundreds to establish beachheads and supply their forces on the Italian mainland. A hundred Axis soldiers are said to have surrendered without a struggle when one of these monsters emerged from the surf with machine gun blazing. As the illustration above shows, the "Duck" is now equipped to do some shooting on its own behalf. Armed with a swivel-mounted, 50-caliber machine gun, it can help fight attacks from any direction. Watch the news stories from the many fighting fronts and you'll notice that the "Duck" is out in front in most amphibious operations.

LET'S ALL BACK THE ATTACK

BUY MORE WAR BONDS

GMC TRUCK & COACH DIVISION GENERAL MOTORS

Home of Commercial GMC Trucks and GM Coaches . . .
Volume Producer of GMC Army Trucks and Amphibian "Ducks"

(Continued from page 118)

is held by Barrett & Hilp, under direction of the U. S. Maritime Commission. Maintenance of vibrators is supervised by Harry L. Clark, foreman, electrical tool maintenance department, who devised many of the ingenious methods here described.

★ ★ ★

Traveling Scaffolds

Erect Blimp Hangars

(Continued from page 77)

a splice connection with the adjacent section. The four derricks also erected diagonal bracing units, prefabricated in the yard, placed all roof purlins and rafters, and lifted all roof sheathing to various levels on the scaffold, where it could readily be passed to the exterior of the

(Continued on page 122)



ARMSTRONG DROP FORGED WRENCHES

All ARMSTRONG Construction and Structural Wrenches are drop forged from special analysis tool steel, and heat treated. Openings are accurately machined, handles are long and tapered for ease in lining up bolt holes.

"Construction" Wrenches in Chrome-Vanadium or Carbon Steel—with 15°, 45° or 90° angle heads with openings of from 7/16" to 2".

"Structural" Wrenches with straight heads and off-set handles, in Chrome-Vanadium or Carbon Steel in the sizes listed above.

"Box Socket Structural Wrenches, in Chrome-Vanadium only, with double hexagonal (12 point) openings from 1½" to 2½". (Recommended wherever an open end wrench is not required because of these safety convenience features. Write for Catalog)



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NOBODY LIKES ROUGH RIDING



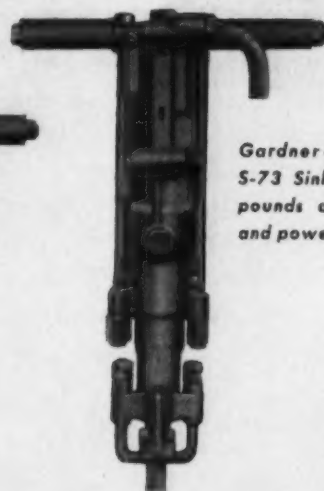
Who likes rough riding on a construction job—nobody! The men can't do their best work with rough-riding rock drills—and contractors can't make satisfactory progress under such conditions.

Gardner-Denver Sinkers are *popular* drills because they are especially designed for easy riding and balanced performance. And because they permit more footage per shift, they're preferred by contractors, and quarry operators too!

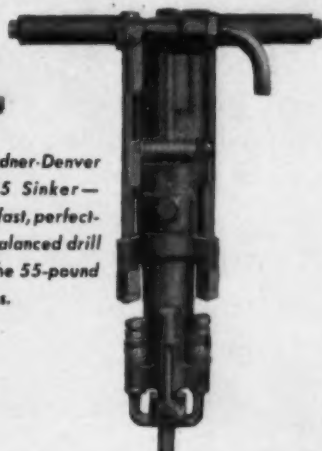
Noted for their powerful four-pawl rotation—for their thorough hole cleaning—and for their low air consumption—Gardner-Denver Sinkers can increase output on your workings. For full information, write Gardner-Denver Company, Quincy, Illinois.



Gardner-Denver S-79 Sinker—an exceptionally powerful drill of the 80-pound class.



Gardner-Denver S-73 Sinker—67 pounds of speed and power.



Gardner-Denver S-55 Sinker—the fast, perfectly balanced drill of the 55-pound class.



Gardner-Denver S-45 Sinker—a favorite among users of the 45-pound class.

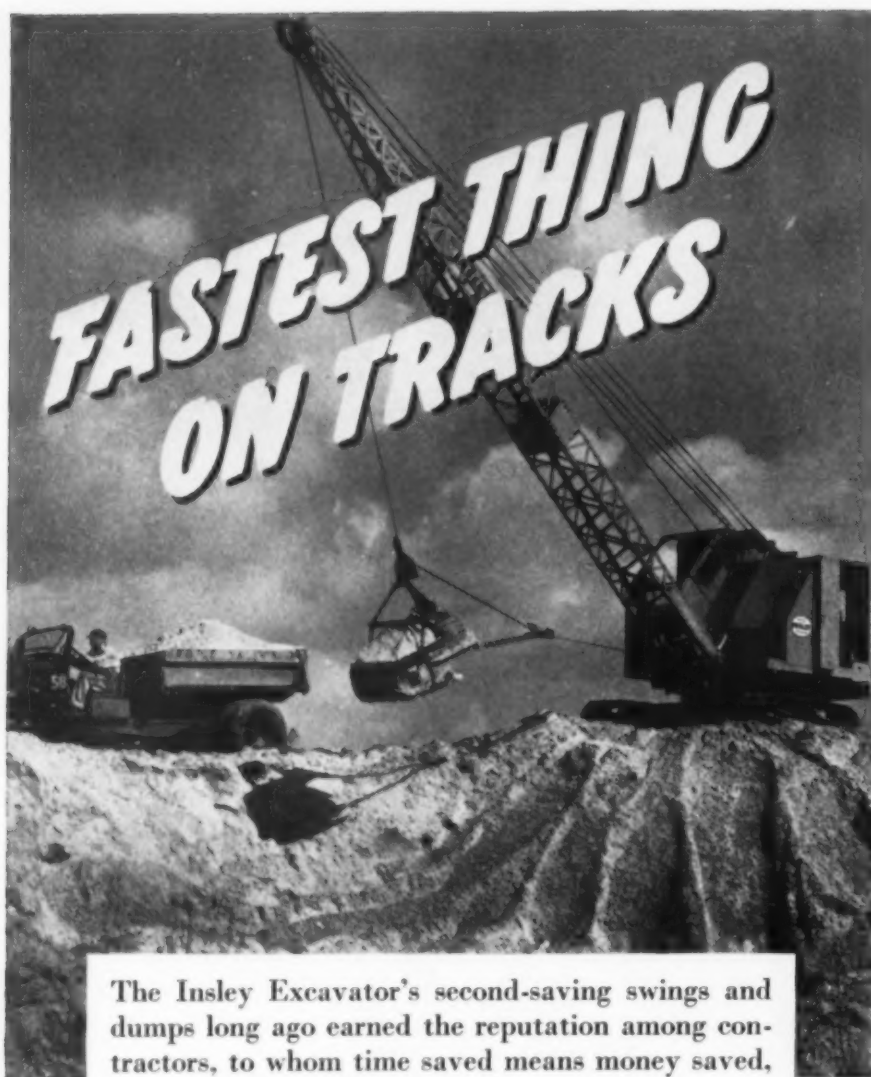


Gardner-Denver S-33 Sinker—an outstanding performer for its weight class.

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Since 1859



The Insley Excavator's second-saving swings and dumps long ago earned the reputation among contractors, to whom time saved means money saved, as the "fastest thing on tracks."

Today, in the front-line service of our armed forces, this same Insley characteristic is demonstrating its effectiveness in constructing landing strips, roads and many other types of military installations in record time . . . and at a record savings in money and even lives.

For these reasons, every Insley we can build now has a battle-front destination. But when that great day comes, there'll be plenty of Insleys for your tough jobs and all of them will be superior to any you have ever seen or used.



(Continued from page 120)

arches. At no time was roof sheathing more than one complete bay behind arch erection.

Arch sections were assembled in a fabricating yard about 500 ft. from one end of the hangar. Timber members for the arch trusses had been accurately pre-cut and prebored at a West Coast mill, and they could be assembled into truss sections without the necessity of using jigs. A guy derrick at the center of the yard picked up completed arch sections and placed them in upright position on wooden carrier frames supported by steel beams spanning between railroad flat cars on parallel tracks. The truss sections were rolled forward on the carriers to a point where they could be picked up by the derricks on the traveler. The railroad flat cars also transported sections of diagonal bracing ready to be picked up and set between the arches.

Hurricane Strikes Job

Erection methods were thoroughly tested by a hurricane which passed over the station on July 27 and 28, when 24 arches had been erected and 22 had been completely sheathed. Wind velocities of 69 knots (75 mph.) were recorded, with estimated velocities as high as 75 knots (86 mph.). For about 2½ hr., during which no recordings were made, it was estimated that velocities as great as 100 knots (115 m.p.h.) were reached at the top elevation of the hangar. After the storm, a complete check of the entire hangar structure, including accurate measurements of the arches and door pocket towers, revealed no deformation that could be detected.

At the time of the storm, the two steel masts were still in place at the south end of the hangar, and the hangar structure was securely anchored to these towers. As an additional precaution, the north end of the structure also had been braced and guyed to the traveling scaffold in preparation for the hurricane. The only damage was the loss of three roof joists (rafters) which had not yet been completely bolted down at one end in the last bay; these joists were torn loose and fell to the ground, breaking one roof purlin on the way.

Progress

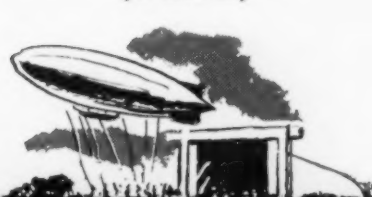
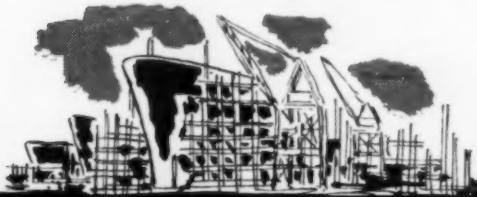
Erectors began raising and splicing sections of the first arch on June 18, 1943, while the traveling scaffold was still under construction, with the object of gaining time by reinforcing the first two bays to form a beam before the scaffold would be completed and ready for its first move. By July 6, auxiliary bracing of the first two bays had been completed, the two 150-ft. steel masts had been set and guyed, and the reinforced arch unit had

(Continued on page 124)

ENGINE HOUSES
for New York Central

SHIPYARD STRUCTURES
for Kaiser

BLIMP DOCKS
for the Navy



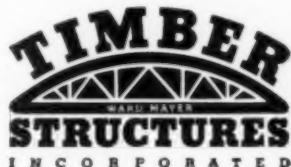
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Before and during the war period it has been our privilege to work with many major industries and with various branches of the U. S. Government.

Your inquiries for current or contemplated construction are welcomed. Information as to our experience and performance record will be given gladly, and if you would like a pictorial booklet of the jobs we have done and are doing, simply fill out and mail the coupon.



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These ruggedly built portable lubricating units will "field service" that isolated equipment, with speed and

thoroughness and save valuable horsepower while doing it. One man—will do a better job with a Graco Convoy Lubr.

A new catalog No. 134 describing these and other "equipment saving" lubricating units, has just been released—write for your copy Today.

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The Model VE-4, dimensionally illustrated above, is a typical example of the extremely compact power packages that carry the Wisconsin name plate. This 4-cylinder V-type engine delivers 22 hp. at 2600 rpm. Other Wisconsin air-cooled engine sizes run from 1 hp. to 31 hp. Get our literature and check for Size and Power on your equipment.

Most H.P. per pound

WISCONSIN MOTOR
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MILWAUKEE 14, WISCONSIN, U. S. A.
World's Largest Builders of Heavy-Duty Air-Cooled Engines

(Continued from page 122)

been anchored to the masts. On the same date, the scaffold was complete and ready to move ahead for normal erection of arches. The last arch was completed August 23. During the interval between these dates, about two weeks had been lost because of the hurricane and extreme rains. Average progress was one and one-half completed bays per day, including erection of sheathing, catwalks, trolley beams, electric conduit work, and other features.

Erection of the wooden box girder over the door opening at the south (starting) end of the hangar was delayed by slow receipt of lumber. Because the traveling scaffold could not be detained at this end of the hangar until the lumber arrived, it was necessary in later erecting the girder to use a special temporary scaffold instead of the traveler, which had been designed for the purpose.

At the opposite end of the hangar, the box girder was erected on the traveling scaffold, and the steel frames for the doors were utilized to support the cantilever sections of the girder. With four derricks for hoisting material, and an adequate number of scaffold platforms available for workmen, the erection of this girder took only about one-half the time required for the girder at the other end of the hangar. The derricks on the traveler also erected the steel doors.

Wedges and screw jacks were used to control camber accurately at all times in constructing the box girders over the top of the scaffold. The girders were designed and fabricated for a camber of 2 in. at the center. After removing the falsework, the girders had a finished camber of more than 1 in., a result which is considered a credit to the designers, the fabricators and the erectors.

Fire-Treated Lumber

All lumber used in the hangar had been given chemical salt treatment for fire resistance. Structural lumber for the arches and box girders was Douglas fir, fabricated by the Henry Mill & Timber Co., Tacoma, Wash. After fabrication, this lumber was stopped in transit to the job for fire treatment. Diagonal bracing, roof framing, sheathing, catwalks and other miscellaneous items were fabricated on the site from Southern pine lumber which had been fire-treated in transit to the project, prior to fabrication. To avoid delay in treating the fabricated Douglas fir members and the Southern pine lumber, treating plants were used at the following points: Wilmington, Calif.; Texarkana, Tex.; Houston, Tex.; Fordyce, Ark.; Shreveport, La.; and Gainesville, Fla. About half the total lumber was treated

(Continued on page 126)

The illustration depicts a road construction site. In the background, a vintage truck is parked on the side of the road. Several workers are visible, some using tools to patch the pavement. In the foreground, a series of traffic signs are arranged along the road. A large, dark, tilted sign reads: **Arrange Your CONCRETE PATCHING SCHEDULE for 24 Hour Repair Service**. Below this, a sign says **TRAFFIC DETOUR MEN AT WORK**. Further down, a sign reads **DON'T HURRY • REDUCE YOUR SPEED**. At the bottom left, a large sign says **SLOW MEN AT WORK ON PAVEMENT**. At the bottom, a row of four signs reads: **DON'T SPEED**, **SLOW PAVEMENT**, **WAR PATCHING**, and **TRAFFIC WORK**.

**Arrange Your
CONCRETE PATCHING
SCHEDULE
for 24 Hour Repair Service**

Pavement patching must not be permitted to delay vital wartime traffic with sign cluttered pavements and extensive detours. Old-fashioned patching methods and delayed repairing are inadequate to meet the wartime need for uninterrupted flow of materiel.

Twenty-four hours is plenty of time for concrete to acquire safe opening strength. This is true even at low temperatures when proper cold weather concreting practices are followed. Just take advantage of the property of calcium chloride to produce required opening strength in about half the usual time.

The gains in strength resulting from the use of calcium chloride are uniform in mixes with either standard portland, high-early-strength or air entraining cement. No matter which cement you use calcium chloride will cut in half the time required to provide good patches. And, with calcium chloride in the mix you also get "built-in curing" to produce higher strength at all ages.

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Advise us, then, if you will, what your requirements are likely to be in the period following the peace. For instance:

(1) What you are possibly going to need in Crushers, Screening and Conveying equipment, portable or permanent.

(2) Write us what improvements you would like to see made in equipment to meet your Post-War needs.

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Kingston, N. Y., U. S. A.

DISTRIBUTORS IN ALL PRINCIPAL CITIES OF U.S.A.

(Continued from page 124)

by the American Lumber & Treating Co. and the remainder by the Protexol Corp. All sheathing was kiln dried after treatment.

Direction

For the Navy Department, design and construction of all facilities at the Hitchcock (Tex.) Naval Air Station are carried out by the Bureau of Yards and Docks, of which Rear Adm. Ben Moreell is chief. The writer has served as officer in charge of construction for the Bureau of Yards and Docks at the station. For the joint contractors, Norgaard & Shaw, Vilbig Bros., Inc., and Nathan Wohlfeld, of Dallas, Tex., H. F. (Red) Ulrich is project manager, J. M. Nagle is assistant project manager in charge of engineering construction, and L. H. Gamache is general superintendent.

★ ★ ★

Army Airfield Job

(Continued from page 67)

structed, about 6,000 ft. long. These runways, located almost at right angles with each other, intersect near the center of a large concrete-paved landing mat 2,000 ft. square. Taxiways connecting the ends of the runways with one another and with a previously paved apron in the hangar area involved a total length of some 15,000 ft., paved with concrete. Runways are flanked on both sides and taxiways on the uphill side by paved gutters 25 ft. wide consisting of 1½ in. of asphaltic concrete on a 4-in. asphalt-penetrated stone base over a gravel sub-base.

Soil Conditions—As noted in the December 1942 article, the three previous grading contracts required the movement of 9,000,000 cu.yd. of excavation in leveling hills up to 87 ft. high and filling gullies to depths as great as 48 ft. Under 10 to 15 ft. of unsoiled brown glacial till was found a blue glacial material consisting of very compact boulder till, weighing up to 148 lb. per cu.ft. The glacial till, consisting of gravel, sand, silt, and clay, was interspersed with rounded boulders of varying size, tightly bonded in the mass. Blasting was employed to shatter the boulder till for loading by shovels of 2-yd. size or larger, and the broken lumps were compacted with bulldozers and hauling equipment. In carrying out soil investigations of the graded field for paving, the U. S. En-

(Continued on page 128)

9 Items to Check When Ordering Wire Rope

(Note: Every day, several orders are received which require correspondence and delay because of insufficient information.)

Listed below are items which can be used as a wire rope specification check list. Because wire rope is a controlled material, CMP allocation or symbol, also certification, must be included before orders can be entered.)

WIRE ROPE CHECK LIST

Item	Example
1. Length	120 Feet
2. Diameter	3/4 Inch
3. Number of Strands	6
4. Number of Wires per Strand	19
5. Lay	Right Lang Lay
6. Core	IWRC
7. Kind of Fabrication	PREformed
8. Grade	(Improved Plow Steel) Monarch Whyte Strand
9. Use	Make, Model of Equipment (Plus . . . CMP allocation or symbol, also certification.)

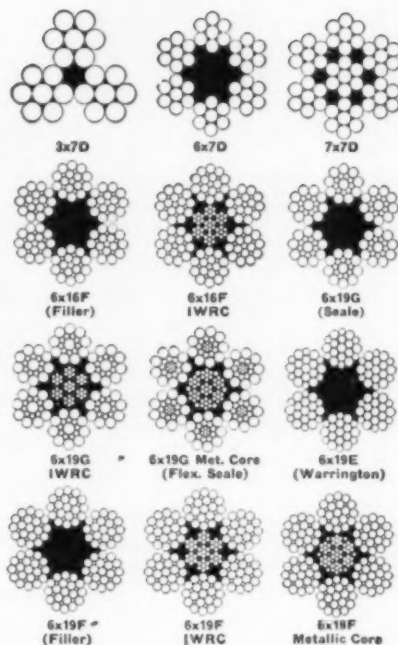
Here are all these items for this order.
120 feet 3/4-inch 6 x 19 Right Lang Lay with IWRC PREformed Monarch Whyte Strand Wire Rope, to be used for hoist line on Model 45 Lorain Skimmer.

Note: For more complete detailed information on how to specify wire rope, refer to Macwhyte G-15 Wire Rope Catalog, pages 89 to 101.

The above check list is normal and complete as to the specifying of wire rope in peacetime, but it is more important than ever in wartime when it is so difficult to get wire rope.

STATE USE FOR ROPE—IT HELPS

Always include the type of service for



These are but a few wire rope constructions taken from our G-15 Wire Rope Catalog to indicate the vast number of types and constructions of wire rope that are made. As wire rope manufacturers, we are in a position to help wire rope users obtain the correct rope for their specific needs.

which the rope is wanted. Then if an error is made in listing the proper construction, or if our experience has shown a different construction gives better service for this purpose, we may be able to help you obtain a better rope. In some cases such information today, makes possible your getting a wire rope to meet your needs when the rope you specify is not available but a similar one is available that might do an even better job for you at no additional cost.

HOW TO MAKE SURE OF CORRECT ROPE FOR YOUR EQUIPMENT

There are hundreds of different sizes, grades, and constructions of wire rope. For many years we have cooperated with wire rope users to get the correct ropes for all kinds of equipment. We have watched these ropes give outstanding service on equipment like yours.

The benefit of that experience may help make your wire ropes last longer, or may help you in specifying what we believe is the finest wire rope you can buy — the *correct* rope for *your* equipment: Monarch Whyte Strand PREformed.

Monarch Whyte Strand PREformed has recorded outstanding service records because:

It's made from selected steels.

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Tested — Proved*

*The correct rope for
your equipment*

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WIRE ROPE

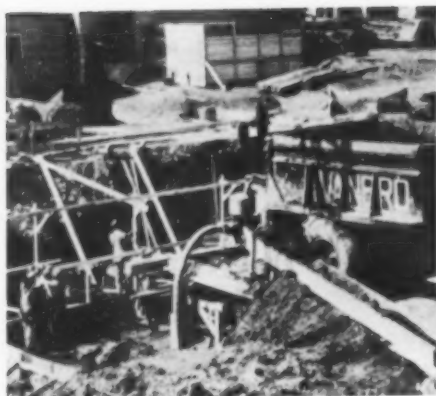
MANUFACTURERS

The correct rope for your equipment

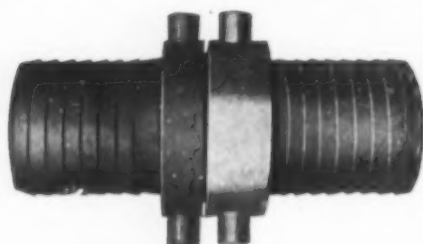
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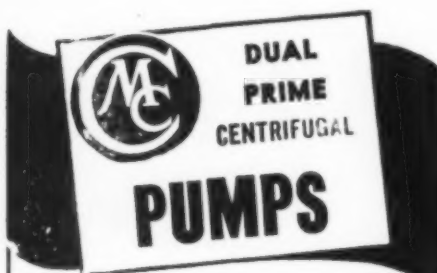
(Continued from page 126)

gineers made bearing tests which indicated that a substantial thickness of base course would be required on the fill material to support a rigid pavement of economical thickness.

Design of the base course for the pavement was based on the belief that influence of heavy plane loads on the pavement could be spread to a reasonable unit stress on the fill material at a depth of 5 ft. below pavement subgrade. In a few localized fill areas it was necessary to excavate as much as 7 ft. below pavement subgrade, and the excavation was backfilled with 5 1/2 ft. of imported gravel, compacted in 6-in. layers to a dry density of 125-130-lb. per cu.ft. This gravel fill was sealed against water penetration from above by 6 in. of a selected glacial till with boulders removed, which was compacted at optimum moisture content. On top of the glacial till seal a final 12-in. course of compacted gravel was placed in two layers as a base for the concrete pavement. This base course of non-frost-heaving material protects the pavement from heave action.

Undisturbed glacial till in cut areas satisfied all load-carrying requirements, and the surface material was removed

(Continued on page 130)



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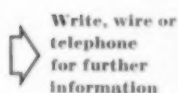
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... are the choice of those who want JACKSON standards of quality, dependability and performance. No other flexible shaft vibrator can offer such assurance.

Supplied with a 2 $\frac{3}{8}$ " and a 1 $\frac{3}{4}$ " head. These two heads give user a vibrator efficient in and suitable for a wide range of applications. For instance, from wall sections of comparatively large size to narrow sections.

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ELECTRIC TAMPER & EQUIPMENT CO.
 LUDINGTON, MICHIGAN

(Continued from page 128)

only to 6-in. depth below pavement sub-grade to allow construction of a 6-in. compacted gravel, non-frost-heaving base for the pavement. The previous grading of the overall field had been carried to final grades. In the pavement area, excavation of 12 in. over cut areas and 18 in. over filled areas was required to accommodate a 6-in. slab thickness and a 6- to 12-in. compacted gravel base course. This type of excavation was considered Class A. All other excavation, below the depths indicated above, for further strengthening of the sub-base was Class B.

Excavating Equipment

Of about 1,100,000 cu.yd. of Class A excavation, two-thirds was removed by carrier scrapers and one-third by power shovels. Shovels and trucks were used for this excavation in the mat area, where hauls to disposal points exceed 2,000 ft. and where the undisturbed boulder till was too hard for economical loading by tractor scrapers. The shovels dug all Class B excavation, amounting to 500,000 cu.yd.

Scraper equipment included eight 12-yd. Tournapull outfits with pneumatic-tired two-wheel tractors and seventeen 12-yd. LeTourneau scrapers drawn by Caterpillar D8 crawler tractors. Tractor-drawn heavy-duty rooters broke up the tough boulder till for the scrapers, and pusher tractors assisted the crawler tractor outfits as well as the Tournapulls in loading.

As excavation had to keep ahead of gravel sub-base, the contractors distributed a total of 14 power shovels between the airfield and the gravel pits in such a way as to maintain a balance between the two operations. Delivery of gravel to the job was affected by other factors in addition to shovel capacity at the pits; some of these factors were the amount of overburden to be moved in stripping the gravel deposits, the length of haul and the number of trucks available. More than 200,000 cu.yd. of overburden had to be removed in uncovering nearly 1,000,000 cu.yd. of gravel at a dozen different sites.

Shovels were mostly Northwests of good size, 1 $\frac{1}{2}$ -, 1 $\frac{3}{4}$ - and 2-yd., with a few 1 $\frac{1}{4}$ -yd. machines. Large shovels were needed to handle the boulder till in airfield fill areas. Eight shovels at the field ordinarily could load 8,000 cu.yd. on a 10-hr. shift, while the six other excavators including the smaller units, stripped the spoil and loaded about 8,000 cu.yd. of gravel at the pits. During long summer days on the earlier part of the excavation, when sufficient operators were available to man two 8-hr. shifts, the shovels moved as much as 15,000

(Continued on page 132)



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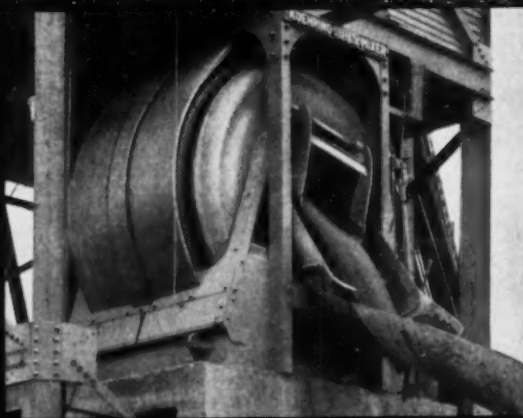
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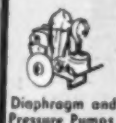
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(Continued from page 130)

yd. of airfield excavation and 16,000 yd. of gravel and spoil in a day.

Large truck fleets were needed to keep pace with the original construction schedule for gravel quantities which amounted to 800,000 cu.yd. Many of the trucks were 10-yd. capacity, struck measure, with others of 8-, 6-, and 5-yd. size. When hauling from three or four pits at an average one-way distance of 6 mi., 100 trucks delivered the gravel to the job. As the demand for gravel continued and the distance to new pits increased to 8 and 9 mi., the fleet was augmented with additional units, chiefly 5-yd. size, to a total of more than 200 trucks, averaging 12,500 cu.yd. of gravel delivered per day, with a peak of 14,000 cu.yd.

Glacial gravel acceptable for pavement foundation was found in kames with a variable depth of overburden up to 7 ft. Spoil removed in uncovering the gravel was cross-sectioned and paid for as Class A excavation, 100-cu.yd. payment for each 115 cu. yd. in the spoil pile. The material selected was well graded from coarse to fine with from 50 to 65 percent passing No. 4 sieve. Further to permit free drainage and reduce frost-heave

(Continued on page 134)



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WORTHINGTON

Blue Brute

Worthington Pump and Machinery Corp.

(Continued from page 132)

characteristics in the gravel base under the slab, no more than 10 percent passing the 200-mesh sieve was permitted. To produce necessary compaction (95 percent of modified Proctor test optimum density), water was added and five sheepfoot rollers were required, in addition to eight three-wheel rollers.

Concrete Ingredients

Trap rock and sand unloaded from barges were transported to the job by the Colonial Sand & Stone Co., New York, in ten-wheel Mack trucks of 12-yd. capacity, struck measure, powered by Mack and Cummins diesel engines. Bulk cement was delivered by rail in LCL containers to a freight siding about 4 mi. from the airfield. A crane unloaded the containers either into bulk-cement trucks or into a 750-bbl. bin under which trucks were loaded. Three cement batching plants at the job had a total storage capacity of about 1,200 bbl. With three pavers placing 2,500 cu.yd. of concrete in a day, the daily cement requirements amounted to about 3,800 bbl. Consumption of aggregates on such a day totalled about 3,400 tons of stone and sand. Trap rock was used in two separated gradations, 2-in. and ¾-in. maximum size.

Pavement concrete, designed for a compressive strength of 4,500 psi. at 28 days, contained 6 sacks per cu.yd. of Vinsol resin cement. Portland cement containing Vinsol resin was specified for the pavement with a view to improving the durability and scale-resistance of the concrete in a region where chemical salts frequently are used for ice removal. The Vinsol resin was added to the portland cement clinker, prior to grinding at the mill, in the 0.025 to 0.040 percent range permitted by U. S. Engineer specifications. Minute voids of entrained air, formed in the concrete as a result of using Vinsol resin cement, reduced the weight of the wet concrete about 4 lb. per cu.-ft., from about 159 to about 155 lb., as checked by periodic weight measurement of 1/3-cu.ft. samples dug out of fresh mixture placed on the subgrade.

Pavement Joints

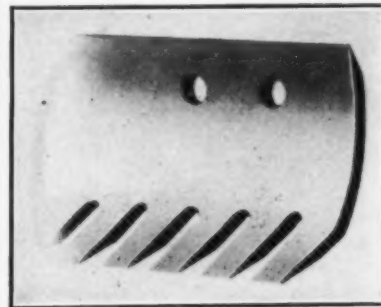
The pavement was placed in alternate 25-ft. lanes, with keyed joints between lanes except on the center line of the runways and every 100 ft. in the landing mat, where ¾-in. premolded expansion joints were installed without dowels. Transverse ¾-in. premolded expansion joints with steel load-transfer devices were placed at 100-ft. spacing in each 25-ft. lane, and transverse contraction joints were cut in the slab 1½ in. deep and ¾ in. wide at 20-ft. intervals be-

(Continued on page 136)

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**Uniform Quality
Give Longer Life**
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These are specific advantages that come from definite design and construction features. The blades are made from special refined high carbon, high manganese plow steel—

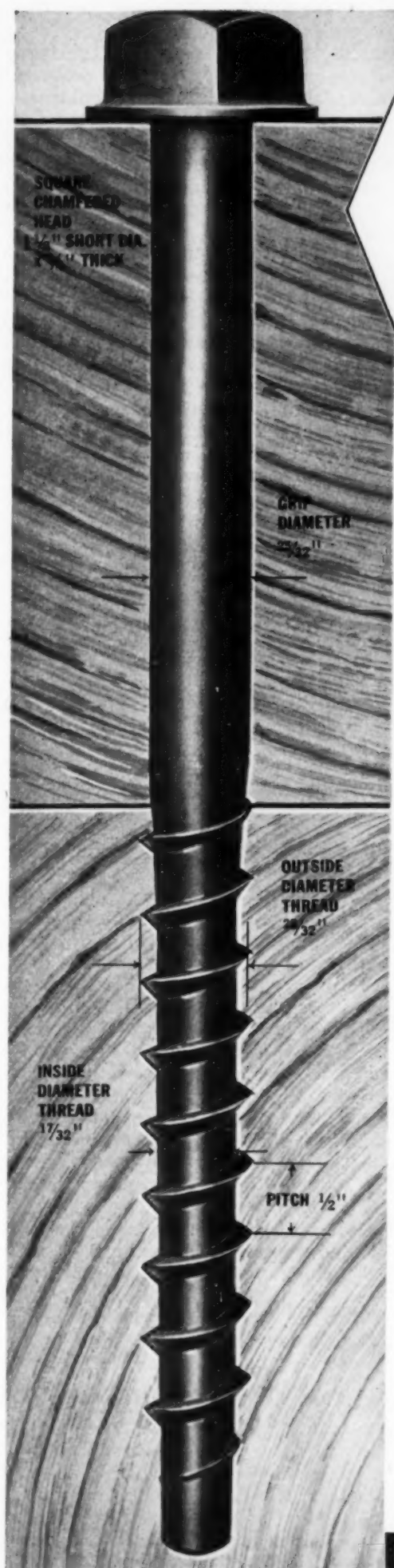
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With greater holding power than previous designs, this new Oliver Screw Spike is well suited for use on wooden trestles, bridges and other structures. Its greater holding power is accounted for by the fact that the Oliver Screw Spike must be *screwed in all the way*. A half-inch hole is drilled and the spike is screwed in. The pilot point makes it unnecessary to do any driving—even to start the spike.

The new Screw Spike is 25/32 inches in diameter and 10½ inches in length. The grip, which goes through the first timber, is 4½ inches long and the screw portion is 6 inches. Thousands of these spikes have been delivered to one prominent railroad and thousands more are on order.

The integral washer head assures a tight grip and eliminates a possible source of corrosion between washer and head.

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Concrete Vibrators



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VIBER, backed by years of experience in the manufacturing of internal concrete vibrators, has had its equipment and methods proved on most of the world's largest engineering projects. In service with most of the nation's leading contractors, Viber Vibrators have stood up superbly under years of punishing use. Viber equipment is being constantly improved to meet new problems in concrete construction. The newest developments and a list of "Viberated" structures appear in our latest catalog.

WRITE
for our latest
catalog describ-
ing all the new
Viber developments

726 South Flower Street
BURBANK, CALIFORNIA

VIBER
COMPANY



(Continued from page 134)
tween expansion joints. On part of the landing mat, the transverse contraction joints contain $\frac{1}{8}$ -in. thick ribbon-type filler; all other transverse contraction joints were filled after the concrete had hardened by pouring with hot asphalt filler. In the center line of each 25-ft. lane, a joint machine cut a 2-in.-deep longitudinal contraction joint and installed $\frac{1}{8}$ -in. thick ribbon-type filler.

The 8-6-6-8-in. cross-section of the 25-ft. lane reduced by straight taper from 8 in. at the edge to 6 in. in a distance of 3 ft., except at outer edges of pavement and adjacent to longitudinal expansion joints, where the reduction was made in 12½ ft.

In the mat, five shallow gutters, about 400-ft. centers, were formed by hand-finished 12½-ft. lanes. The 2,000-ft. mat slopes generally 1 percent in one direction and $\frac{3}{4}$ percent in the opposite direction. Surface drainage of the mat is taken by 160 rectangular inlets, 16x2 ft. in plan, emptying into the drainage system.

Paving Operations

Concrete pavement was built under subcontract by the D&F Construction Co., made up of L. O. DeFelice and D. V. Frione, New Haven, Conn. These contractors operated two 34E dual-drum pavers, a Ransome and a Rex. Subgrade ahead of each 34E was cut to transverse profile by a Buckeye R-B power fine-grader and then was rolled.

With a required mixing time of 90 sec. for each batch, including transfer time from the first to second compartment, each dual-drum paver was able to turn out 64 batches per hr. The mixers traveled alongside the lanes being paved. Tank trucks hauled water for mixing and for wetting subgrade ahead of the concrete placement. Gasoline-powered flexible-shaft vibrators, carried on the finishing machine, vibrated the concrete along the edges of the slab and adjacent to transverse expansion joints.

Following each dual-drum paver, a Blaw-Knox two-screed finishing machine struck off and finished the surface of the slab. Behind the finisher, a Flex-Plane joint machine cut the center-line contraction joint and installed the ribbon filler. A manually controlled blade on the same machine cut the transverse contraction joints. After the contraction joints had been made, the surface was floated with a longitudinal float operated by two men on a rolling bridge. Final hand finishing included use of long-handled straightedges and flat floats, followed by dragging with burlap, ahead of the edge and joint finishers. Hunt process asphalt emulsion was sprayed on

(Continued on page 138)

Does Heavy Work Faster at Low Cost!

Simplex No. 22, 10-tons capacity, 12½" lift. Height closed, 21¼". Toe lift only 2¼" from ground level. Other models, 5 to 20-tons capacity.

Simplex Lever Jacks cut costs on many construction jobs because they combine power with safe, speedy operation. Savings of manpower make them especially valuable today. Stocked by leading supply houses everywhere. Send for Catalog 44.

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pact and thus easily towed about. This represented a big saving in hauling costs—plus plenty of action.

Many features contribute to "air-when-you-want-it" Schramm Compressors: (1) Completely water cooled to provide ideal performance both winter and summer. (2) Seven main bearing supports. (3) Mechanical intake valve. (4) More cylinders and lighter parts. (5) Forced feed lubrication.

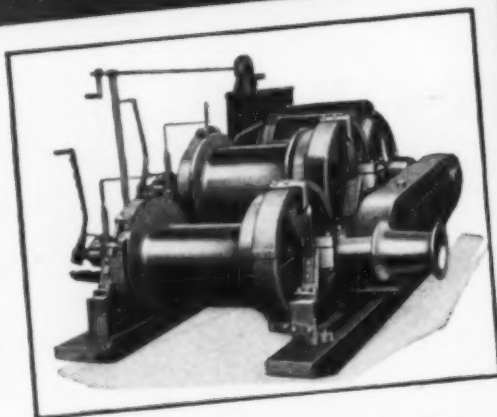
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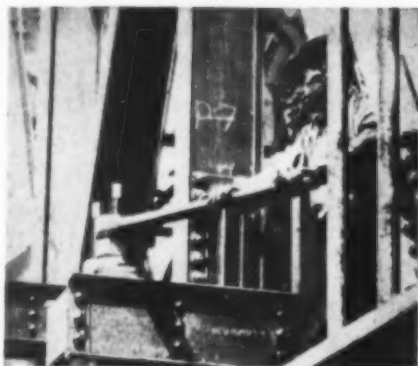
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LOWELL Reversible Ratchet WRENCHES



For running up nuts on anchor bolts and connections, bridgemen need wrenches that will work fast and SAFELY.

The LOWELL "Steel Socket" Bridge Builders' Wrenches—with their positive guarantee that handles will not break—meet the tough requirements of big bridge jobs.

Built in a wide range of types and sizes to cover many needs of the engineering-construction field.

Have patience with your dealer if he is unable to furnish all of the NUMEROUS LOWELL types and sizes, because we are engaged, for the duration, in supplying the needs of our Armed Forces.

LOWELL WRENCH CO.

1869 WORCESTER, MASS., U.S.A. 1943

See how each pawl, when engaged, transmits leverage from the solid stock of the handle, direct to the gear, in a straight line and with a "square" contact. The pawl is in COMPRESSION ONLY—no shear, no tension, no torsion. The shipper carries NONE of the load. This strong construction insures steady service.

(Continued from page 136)

the surface to seal it for the curing period.

April 1, 1943, was the day on which the first piece of equipment arrived on the job. The contract specified that 25 mi. of drainage lines, 8- to 60-in. size, be completed June 1. Despite 22 days lost by rain, the contractor completed the drainage system on the approximate date originally set, using 28 backhoes for trench excavation.

Plans for the airfield were made and the contract was let by the U. S. Engineers, New York District, of which Col. A. B. Jones was district engineer until succeeded recently by Lt. Col. Edgar W. Garbisch. Engineering plans were prepared under Lt. Col. C. K. Panish, chief of the engineering division of the U. S. Engineer Office. Field engineering and construction were under the direction of Lt. Col. Drew C. Ebersson, area engineer, and later of Maj. R. L. Donnelly, area engineer, who coordinated the work in cooperation with Col. George F. Schlatter, field commandant, to minimize interference with active flying operations.

For the Mt. Vernon Contracting Corp., contractor, Mt. Vernon, N. Y., Adam J. Petrillo, secretary-treasurer, was executive manager of the job, with two brothers, Edward and Felix Petrillo, in charge of construction, and a third brother, Arthur Petrillo, in charge of equipment. Joseph M. Gearon, project manager, directed all construction operations, and Jacob Feld, New York, served as engineer consultant to the contractor. Paving work was supervised for the D&F Construction Co., subcontractor, New Haven, Conn., by James Grillo, superintendent.

★ ★ ★

Long Concrete Bridge

(Continued from page 79)

hammer. The piledriver traveled along the centerline of the bridge on railroad rails spaced 29 ft. apart, with transverse movement provided by rails placed atop the main girders for a distance of approximately 50 ft. or a bent length. Built-in hydraulic jacks were used to bring the driver level and plumb as determined by built-in water levels. The driver was held in position by cribbing under the girders.

A pile-spotting template of structural
(Continued on page 140)



The contractor who will be doing the big jobs tomorrow is looking beyond today's horizon. He is making his plans for the future when competition will be keener and jobs will have to be figured more closely. The new methods of doing things brought about by the war will necessitate the most modern equipment you can buy. LIMA will be ready to serve you in this respect with a line of Shovels, Draglines and Cranes that have established material handling records on war jobs all over the country - jobs that were done at top speed and with maximum efficiency.

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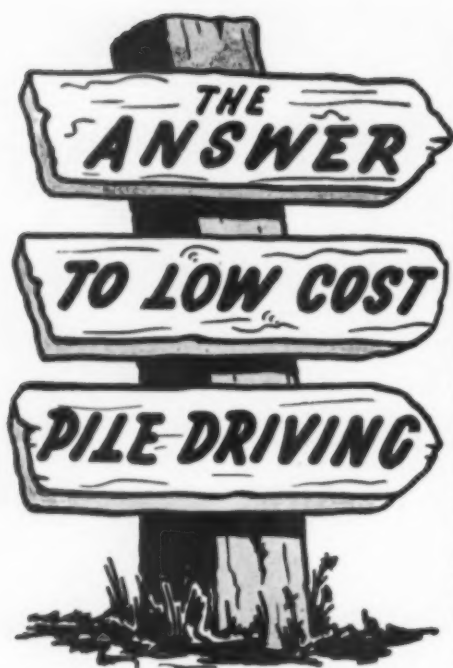
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PILE HAMMERS

18C, 30C, 50C and 80C

In any season of the year for the most extensive pile driving projects, the SUPER-VULCAN demonstrates its ability to get jobs done speedily—with greater ease, and at less cost.

It's the sure hard-hitting blow that counts and the SUPER-VULCAN gives you twice the blows per minute.


Rugged strength—simple design—positive action—durability—compactness are all important features.

The open type fits the same leads and uses the same accessories as the Vulcan Single-Acting Pile Hammer.



Size
18C—30C—50C—80C
meet all needs

VULCAN IRON WORKS
Since 1882
331 North Bell Avenue
Chicago Illinois



(Continued from page 138)
shapes was fastened directly to the girders with three turnbuckles. This arrangement allowed it to be brought to exact position on both the bent and bridge centerlines. The maximum number of piles driven in an 8-hr. day was 19, the minimum was 4, with 11 piles per day the average for the entire job. Only one pile was broken out of 3,151 cast and that was caused by the pile falling while lowering the hammer. No piles were pulled and redriven and none developed enough cracks to be considered broken.

Piles were generally driven to plan grade, but due to variations in the subsoils, some piles did not penetrate as deeply as this and were cut off. Other piles did not develop adequate resistance when driven to grade and were extended below plan grade and built up by splicing. When and how far piles should be driven below grade was left to the

(Continued on page 142)

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Appeal



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Loaders for putting material into trucks twice as fast as an equivalent general purpose tool.

Loaders for making shallow grading cuts—as in stripping top soil at an airport, or otherwise.

Clamshell Buckets for high-power excavating—and getting the work done regardless of handicaps.

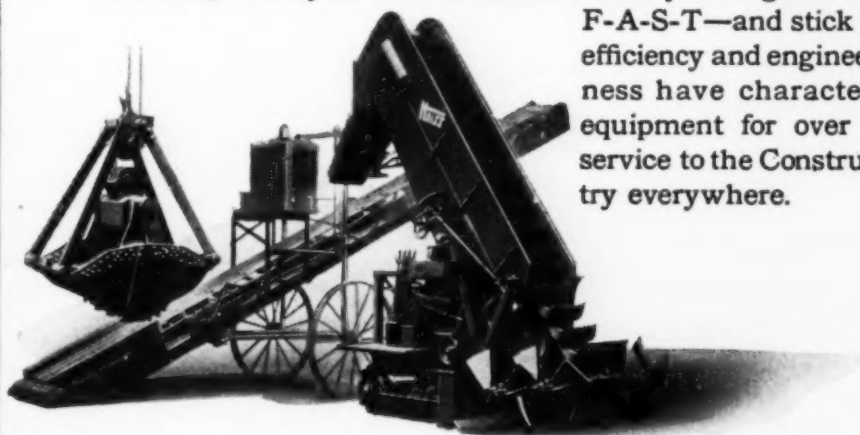
Belt Conveyors for loading, stacking and labor saving handling at dock-side, roofed-in warehouse, or out-in-the-open.

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We're proud to have had Haiss equipment join our fighting forces throughout the world. As every war worker knows, there is a deep feeling of satisfaction and pride in having a hand in making a fighting tool for use against the enemy.

Where and how are Haiss units used? . . . It's a military secret, we can't discuss . . . but there is one thing about Haiss equipment that can be said because it's common knowledge: wherever our loaders, conveyors and buckets are they will get the work done F-A-S-T—and stick to it. Design efficiency and engineered ruggedness have characterized Haiss equipment for over 50 years of service to the Construction industry everywhere.



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ALBION, PENNA.



EXPERIENCE
builds 'em
PERFORMANCE
sells 'em



(Continued from page 140)

discretion of the resident engineer. In cases where it was determined to extend piles, they were driven a minimum of 5 ft. below grade and to a point where the resistance was 25 or more blows per foot and an average of 20 or more blows per foot for the last 10 ft., giving an indicated load-carrying capacity of 52 tons, according to the *Engineering News* pile formula.

Pile caps were 3 ft. 9 in. wide and 2 ft. deep and were cast in place. The sides of the cap forms were of metal, the bottoms of unlined pine lumber. The pile tops extended 6 in. into the cap and base plates for expansion and rocker devices were set in the top of the caps before concrete hardened. Under ordinary conditions, after the organization was functioning smoothly, two caps were poured each week day, starting early in the morning. One crane was used by the cap crew for all work of erecting forms, pouring concrete stripping and curing.

Concrete Deck and Girders

The deck spans consisted of a 7-in. concrete slab on nine girders 1 ft. 3 in. wide and ranging in depth from 2 ft. 2 in. to 2 ft. 5 in., depending on the slope of 3/16 in. per ft. from the curbs to the crown of the deck. Steel falsework beams were secured to the bents by means of hangers. Two spans per day were poured for a period of 41 days, the longest uninterrupted run during the project. Sufficient quantity of the steel forms and falsework beams were provided so that there was no shortage for the maximum pour during long uninterrupted periods.

Concrete for the spans was carried by the standard-gage service railway from the central plant in three 2-cu. yd. buckets per car, each car being hauled by a gasoline-powered locomotive. At various times four cars were tried but three was the number which proved most efficient. Loaded trains had priority over empties, which were held on the nearest passing track. Pile cars and the self-propelled crane also were sidetracked for concrete trains. Checks were frequently made on the time required for delivery of concrete from the mixer to the spans and it was found to be well within the specified limit of 30 min. A concrete mix of 94:217:313, dry weight, was used throughout the job.

The buckets of concrete were hoisted from the cars by a gasoline-powered crane to a hopper with attached chute which was mounted on rails for longitudinal movement on the span being poured. The strike-off was made of structural shapes and was operated parallel to the centerline of the bridge. After the deck concrete was struck-off, it was slat-belted with a belt consisting of five strips of 2x1/4-in. cypress boards spaced 2 in.

(Continued on page 144)



Colonel Herbert W. Alden (Ordnance Reserve)

Dean of Axle Engineering

Chairman of the S.A.E. Ordnance Advisory Committee, Engineer Consultant to the Chief of Ordnance, winner of the Frank Scott Medal (1941) "as a leader among engineers for his services to national defense," twice President of the S.A.E., Col. Herbert W. Alden is the recognized dean of axle engineering.

Director of engineering of The Timken-Detroit Axle Company since 1909, Col. Alden heads an executive engineering staff with an aggregate experience of more than 700 years in the design and development of axles and brakes.

No other organization in existence can duplicate this specialized knowledge of load-carrying, load-moving

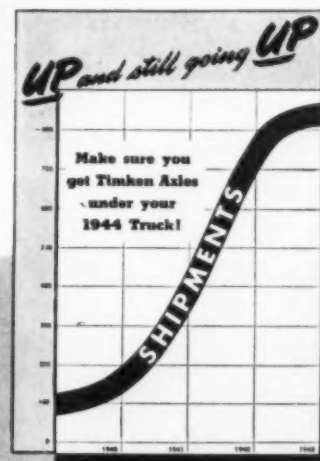
and load-stopping problems in the truck, trailer and bus fields.

As the world's largest builders of axles and brakes for commercial vehicles, Timken has devoted this wealth of experience over a long period of years to the joint tasks of mechanizing and motorizing our modern army and improving the performance of motor transport.

The vast research and technical resources of the Timken-Detroit organization are available now to manufacturers of better vehicles for tomorrow.

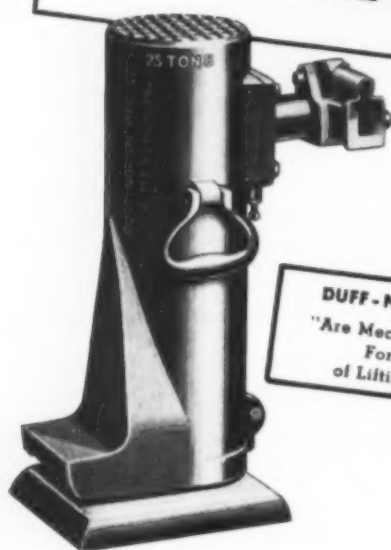
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THE TIMKEN-DETROIT AXLE COMPANY, DETROIT, MICHIGAN
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POWER.. Speed

TO LIFT THE HEAVIEST LOADS SAFELY, EASILY
**DUFF-NORTON
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"Are Mechanical Muscles"
For Every Job
of Lifting or Moving



ON every job be sure you
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to help with the heavy lifting, lowering, pushing and
pulling. Duff-Nortons are husky and powerful—built
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(Continued from page 142)

apart and running the full length of the span plus 2 ft. on each end for handling. It was operated in the same direction as the strike-off, thus removing minor irregularities and bringing sufficient mortar to the surface so that the finished belting, done with a heavy canvas belt, left a distinct herringbone finish. Wet burlap was placed on the green concrete as soon as it would not be marked and curing was resumed early the next morning by replacing the burlap with wet sand and continuing for at least 14 days. All concrete on the spans, as well as all other parts of the project, was vibrated in place with 1½-hp. gasoline-powered vibrators.

Reinforcing Steel for Spans

All reinforcing steel was bent on the site by electrically-powered benders which were placed at or near the site where the steel was used. The steel was stockpiled for each two spans. Although it was originally planned to cast nine spans per 6-day week, it was ultimately found that two spans per day could be placed without difficulty.

During the winter of 1941-42 a 30-hp.

(Continued on page 146)

Save money with accurate construction estimates



You know how much in profits it would mean to you to have more accurate estimates with less discrepancy between estimated and actual costs—how much in business gained by closer bidding. Now, this book helps you achieve these results. It will pay out further in time saved, by helping you to get accurate estimates more quickly and easily.

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653 pp., 6 x 9, many diagrams and tables, \$5.00
Takes up each step of construction work separately—from first investigation to final, detailed estimates—and provides simple, arithmetical methods of accurately estimating costs. Covers estimating with both tables and diagrams and includes specimen tables and diagrams. Both diagrams and tables show variations in quantities as well as in prices of material and labor. Worked-out estimates for typical jobs show application of methods.

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Send me Pulver's Construction Estimates and Costs for 10 days' examination on approval. In 10 days I will send \$5.00, plus few cents postage, or return book postpaid. (Postage paid on cash orders.)

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That more planes may fly

Today, endless caravans of giant trucks are rolling night and day all over the face of America . . . all dedicated to but one proposition: That more planes may fly . . . that more ships may come down the ways . . . that a nation may have everything it needs to fight—and win!

To perform this essential job . . . to make sure that it will be done in the minimum time and with the minimum cost in equipment, manpower and precious fuel stores . . . the country's biggest operators are using the power that, for more than a decade, has been setting the pace in economy, speed and dependability—*Cummins Diesel Power*.

So marked has been this trend to Cummins in the motor transport field that 90% of all long-line, heavy-duty, diesel-driven trucks are now Cummins-powered. Here is ample proof that major fleet owners have learned that the surest way to "get there fustest with the mostest" is to power with Cummins Dependable Diesels. CUMMINS ENGINE COMPANY, Columbus, Indiana.

This is the fifth in a series of advertisements depicting the war-time role of Cummins Diesel Power in the nation's basic industries. If you are operating Cummins Diesels on your job, make doubly sure of their most efficient use by providing for their proper maintenance and service. Ask your Cummins Dealer for details.

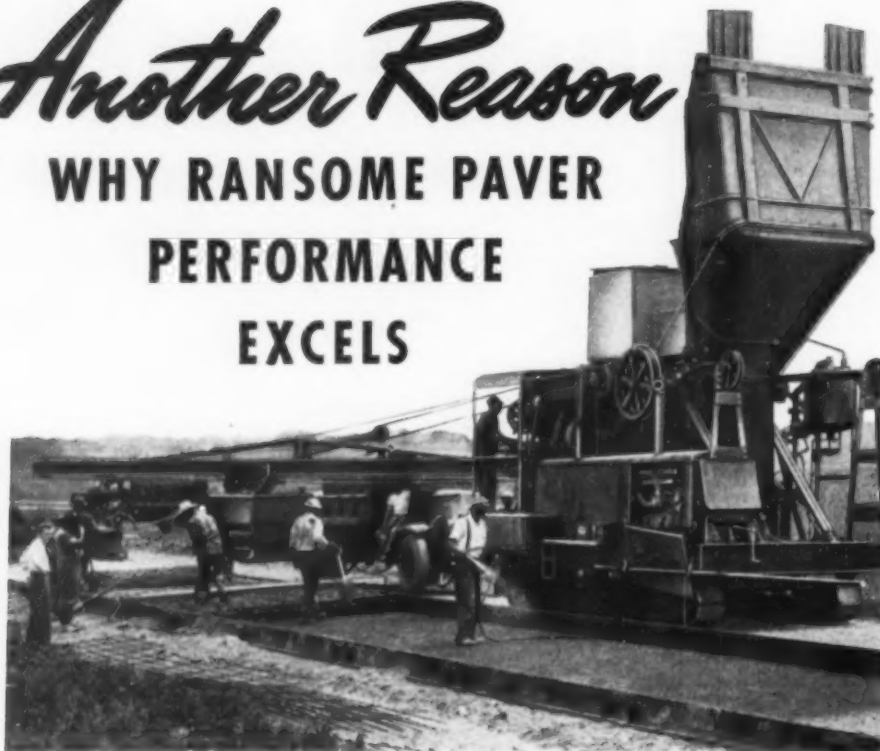


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PERFORMANCE

EXCELS



Further evidence of the uninterrupted performance and low upkeep built into Ransome 34E Single and Dual Drum Pavers is the use of roller bearings at all strategic points in the machines. The Skip Hoist, Traction Clutch, Countershaft, Boom Bucket Clutches, Boom Bucket Carriage Rollers, Boom Hoist, Boom Bucket Drive, Engine Transmission, and Drum Rollers of Ransome Pavers turn in roller bearings, minimizing maintenance and giving long service.

Our engineers have the background and the experience — our manufacturing plant, the know how. When buying your next paver, consider Ransome. There are many reasons why you should... We will be glad to supply them.

Write for further information



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Construction Division

Ransome MACHINERY COMPANY
DUNELLEN, NEW JERSEY

(Continued from page 144)

oil-fired boiler was installed in the water line to the mixer at the central plant and was used on a few occasions when it appeared that the temperature might fall to freezing. The temperature of the mixing water was raised to a point which made the temperature of the concrete 10 deg. above atmospheric temperature.

Grooves for a center dividing curb were left in the deck, with loops of reinforcement extending up from the slab at regular intervals to tie into the curb. Curb forms were metal and forms for the hand-rail were of either metal or wood. One crew did all the work in connection with these items. Forms from the previous day's pour were stripped, set and aligned in the morning to receive a pour in the afternoon—generally two spans per day. The rubbing crew followed closely behind the stripping. Concrete and forms for the rails and curbs were handled by a steel stiff-leg derrick mounted on rubber tires. A form carrier was available if the derrick was in use when needed to transport or set the forms.

Final concrete on the project was poured on Nov. 17, 1942, and between that time and the final inspection on Jan. 12, 1943, the contractor's forces were en-

(Continued on page 148)



Until the War is Won

... highest priorities are diverting the new Byers excavator you want to war fronts all over the world. WHEN THE WAR IS WON Byers will offer you new, improved, faster mobile cranes and shovels for peacetime jobs.

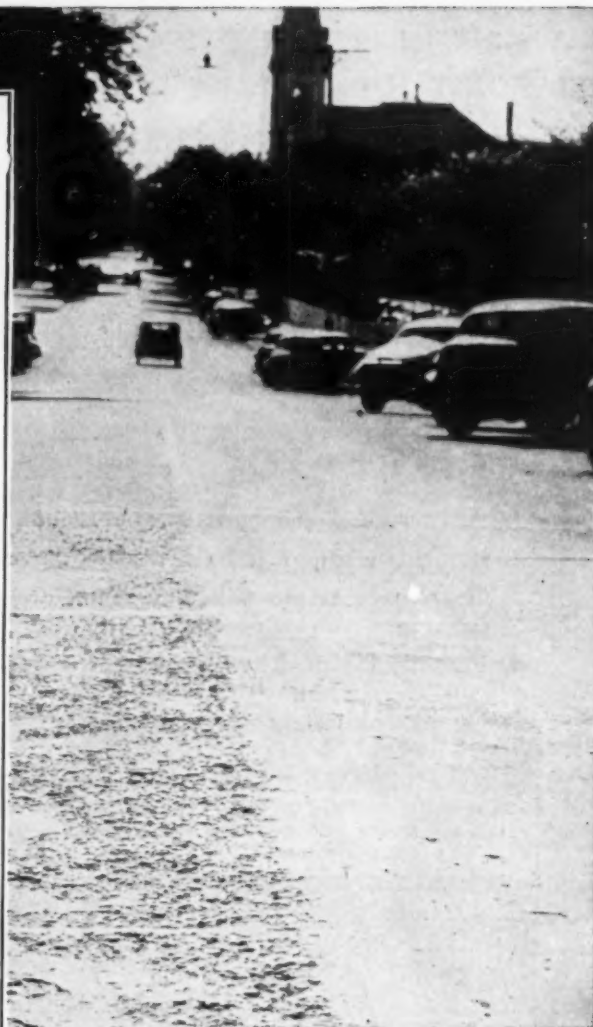
In the meantime, owners of current and older models of Byers shovels and cranes may depend on Byers Parts Service to help them keep present equipment working steadily and satisfactorily.

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DISTRIBUTORS THROUGHOUT THE WORLD

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AIR-ENTRAINING PORTLAND CEMENT FOR SCALE-RESISTANT PAVING

1. Complies with current Federal and ASTM specifications.
2. Renders concrete pavements highly resistant to scaling due to the action of salts used for ice removal.
3. Protects concrete against the effects of freezing and thawing weather.
4. Minimizes segregation and bleeding. Concrete is more uniform throughout and more durable.
5. Permits earlier finishing.
6. Requires no additional materials at the mixer.
7. Called DURAPLASTIC because it makes concrete more durable and more plastic



Lawrence Street, Appleton, Wisconsin, where the right lane was laid with Atlas DURAPLASTIC in July, 1940, at the same time normal portland cement was used for the left lane. Photo taken in 1943 shows the results of three winters of identical salt de-icing treatment.

5 YEARS' RESEARCH PROVES ADVANTAGES OF NEW CEMENT

Atlas DURAPLASTIC is a true portland cement in which a small but very precise quantity of air-entraining material is interground during manufacture. Its commercial announcement in 1943 followed five years of research by Universal Atlas in the laboratory, in the plant and on actual jobs. Some of these are now in their fifth winter. All are practically scale-free. They are described in the following articles, reprints of

which will be furnished on request:

Engineering News-Record
10/10/40—Article on original research and test road.

Roads and Streets Nov. 1943—Article on DURAPLASTIC pavements in Milwaukee, Appleton and Chicago.

Engineering News-Record
12/30/43—Article on DURAPLASTIC pavements in Minneapolis after four winters of de-icing treatment.

Our Technical Service Bureau will furnish detailed information on the use of Atlas DURAPLASTIC—the cement that makes concrete scale-resistant. Write to Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York 17, N. Y.

OFFICES: New York, Chicago, Albany, Boston, Philadelphia, Pittsburgh, Minneapolis, Duluth, Cleveland, St. Louis, Kansas City, Des Moines, Birmingham, Waco.

CM-D-4

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ATLAS DURAPLASTIC CEMENT

A Universal Atlas Product

**A GRIFFIN
WELLPOINT JOB**

**Want it
done
RIGHT?**

Call

GRIFFIN— for

1. An accurate, economical, amply equipped layout
2. Immediate shipment from nearest warehouse
3. Guaranteed results with equipment ready for constant duty without breakdowns.
4. Properly installed by a supervisor who *Knows How*



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HAMMOND, INDIANA

SOUTH

GRIFIN ENGINEERING CORP.
633 N. Myrtle Ave. • Jacksonville 5-4516
JACKSONVILLE, 4, FLA.

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GRIFFIN WELLPOINT CORPORATION



**WHEEL TRACTOR
CRANES**



HOISTING UNITS



TRAILER TRUCKS



LIFT TRUCKS



CONVEYORS



CARTS & TOOL WAGONS



ELEVATORS



GYRO SIFTERS



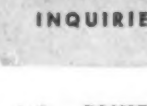
CRUSHERS



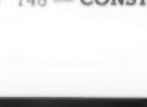
CUTTERS



MILLS & MIXERS



PULVERIZERS



GRINDERS



**COMPLETE
INSTALLATIONS**

MERCER-ROBINSON COMPANY, INC.

INQUIRIES INVITED

The handling equipment construction "know-how" of the Mercer Engineering Works, Inc., Clifton, N. J. . . . The more than 40 years processing equipment experience of Robinson Mfg. Co., Muncy, Pa. . . . All are embodied in and represented by

30 CHURCH ST., NEW YORK 7, N. Y.

(Continued from page 146)

gaged in the final rub, painting, grading under the bridge and other work necessary for completion of the structure. The bridge will be completed by constructing end spans, abutments, some intermediate spans, and earth embankments on each end of the structure to connect the high-level roadway between the levees. It is probable that this work will be finished and the approaches paved in time to permit traffic over the new location early in 1944.

Contract cost of the work to date is approximately \$3,400,000, with most of it coming from federal funds appropriated for flood control projects. Approximately \$87,036 was paid by the State of Louisiana for testing and field engineering expenses. Project manager for the contractors was Gordon Walker.

Design, surveys, foundation borings, plans and construction supervision were provided by the Louisiana Department of Highways, of which H. B. Henderlite is chief engineer; N. E. Lant, bridge design engineer; R. B. Richardson, construction and maintenance engineer; J. N. Ball, district engineer; S. C. Smith, district construction engineer; and George F. Stevenson, resident engineer. All work was carried out under the general supervision of the New Orleans District Office of the U. S. Engineer Department.

QUANTITIES AND COSTS

PILE BENT SUBSTRUCTURE

Item	Unit	Quantity
20-in. Concrete Piles.....	Lin. Ft.	3,525
24-in. Concrete Piles.....	Lin. Ft.	264,500
Class "A" Concrete.....	Cu. Yd.	5,378.38
Reinforcing Steel.....	Lb.	808,576
		Unit Cost
20-in. Concrete Piles.....	3.95	13,923.75
24-in. Concrete Piles.....	4.30	1,137,350.00
Class "A" Concrete.....	23.73	127,628.96
Reinforcing Steel.....	.049	39,634.92
		TOTAL.....\$1,318,537.63

SUPERSTRUCTURE

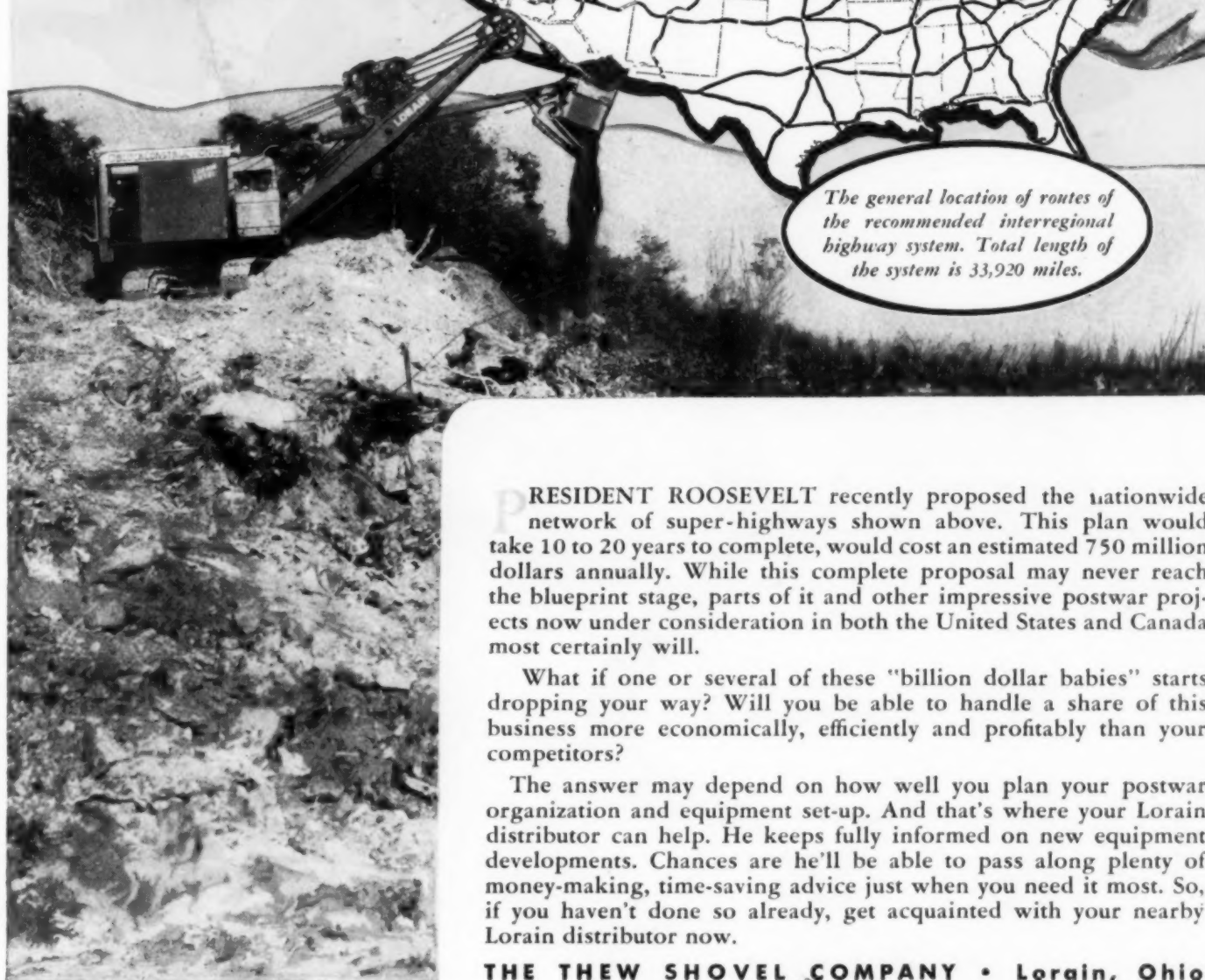
Item	Unit	Quantity
Class "A" Concrete.....	Cu. Yd.	41,702.74
Reinforcing Steel.....	Lb.	12,467,930
Structural Steel.....	Lb.	1,655,446
Handrail.....	Lin. Ft.	35,949.3
Center Dividing Curb.....	Lin. Ft.	18,094
		Unit Cost
Class "A" Concrete.....	23.73	989,606.02
Reinforcing Steel.....	.049	610,928.57
Structural Steel.....	.1065	176,205.00
Handrail.....	3.43	123,306.10
Center Dividing Curb.....	1.79	32,388.26
		TOTAL.....\$1,932,333.95

PILE TESTS

Item	Unit	Quantity
20-in. x 80-ft. Concrete Piles.....	Each	3
24-in. x 80-ft. Concrete Piles.....	Each	85
Loading Test Piles.....	Each	79
		Unit Cost
20-in. x 80-ft. Concrete Piles.....	500.00	1,500.00
24-in. x 80-ft. Concrete Piles.....	575.00	48,875.00
Loading Test Piles.....	150.00	11,850.00
		TOTAL.....\$62,225.00

What if this 15 Billion Dollar Baby

WERE DROPPED IN
YOUR LAP?



The general location of routes of the recommended interregional highway system. Total length of the system is 33,920 miles.

PRESIDENT ROOSEVELT recently proposed the nationwide network of super-highways shown above. This plan would take 10 to 20 years to complete, would cost an estimated 750 million dollars annually. While this complete proposal may never reach the blueprint stage, parts of it and other impressive postwar projects now under consideration in both the United States and Canada most certainly will.

What if one or several of these "billion dollar babies" starts dropping your way? Will you be able to handle a share of this business more economically, efficiently and profitably than your competitors?

The answer may depend on how well you plan your postwar organization and equipment set-up. And that's where your Lorain distributor can help. He keeps fully informed on new equipment developments. Chances are he'll be able to pass along plenty of money-making, time-saving advice just when you need it most. So, if you haven't done so already, get acquainted with your nearby Lorain distributor now.

THE THEW SHOVEL COMPANY • Lorain, Ohio

thew.

Reg. Trade Mark

Lorain

SHOVELS

CRANES • DRAGLINES • MOTO-CRANES



SHACKLE A *Policeman*



...**LAY-SET PREFORMED IS AT EASE**

Putting non-preformed wire rope on your machines is like putting shackles on a policeman. You shouldn't expect a wire rope that is twisted tightly and under constant tension, to operate well or long.

In Hazard **LAY-SET Preformed** every wire and strand is pre-shaped to the exact curve it assumes in the finished rope. That's why **LAY-SET** is at ease, relaxed, free to work and work willingly. Being free of torsional stress, Hazard **LAY-SET Preformed** lasts longer, gives you greater dollar value. Be sure your next rope is Hazard **LAY-SET Preformed**.

Ever since Pearl Harbor, and even before, Hazard **LAY-SET Preformed** has been saving time and money for the Government, the Armed Forces, and the taxpayer.

HAZARD WIRE ROPE DIVISION • Wilkes-Barre, Pa., Atlanta, Chicago, Denver,
Fort Worth, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, Tacoma, San Francisco
AMERICAN CHAIN & CABLE COMPANY, INC. • BRIDGEPORT • CONNECTICUT

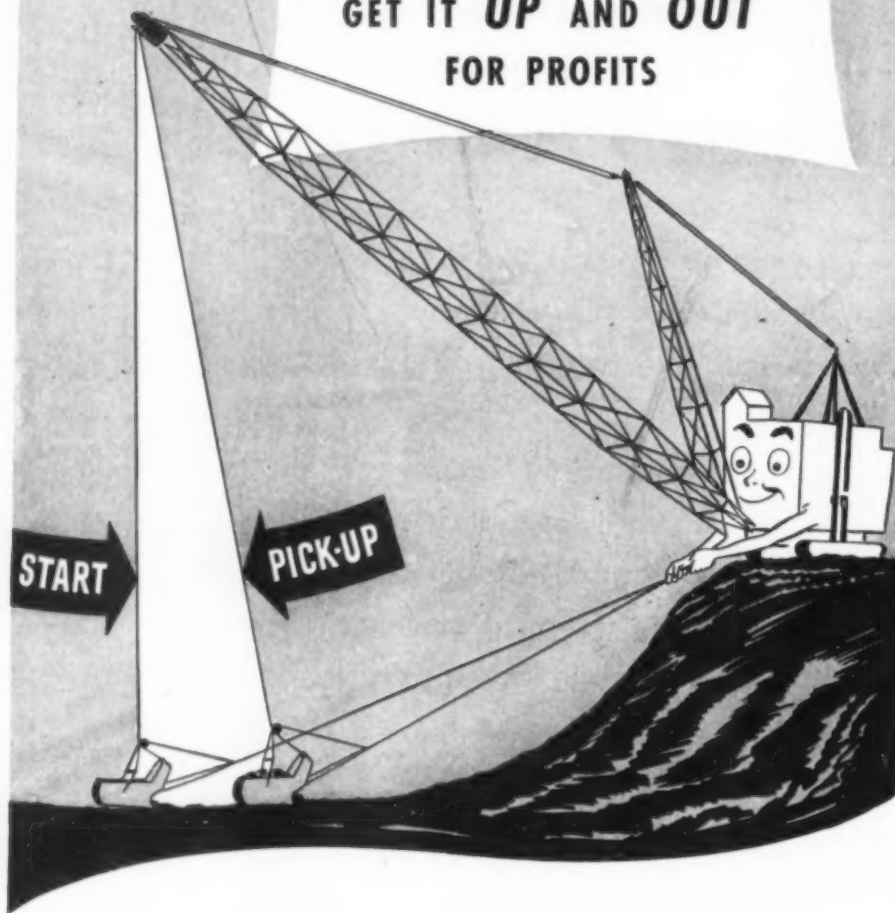


HAZARD **LAY-SET** *Preformed* **WIRE ROPE**

**DRAGLINE
PRODUCTION TIP
NO. 2**

**PICK UP THE
BUCKET AS SOON AS LOADED!**

**DRAGGING A FILLED BUCKET
CAUSES EXCESSIVE BOTTOM
WEAR AND WASTES TIME...
GET IT *UP* AND *OUT*
FOR PROFITS**



Within 1 or 2 bucket lengths, a Page AUTOMATIC Dragline Bucket digs, fills and carries a full pay load. Size for size and weight for weight a Page AUTOMATIC will OUT-DIG any other dragline bucket model

PAGE

Automatic DRAGLINE BUCKETS

PAGE ENGINEERING COMPANY, CHICAGO 38, ILLINOIS

Public Relations

For Contractors

(Continued from page 81)

on low prices and thereby on lower taxes.

- (2) The contract system is like insurance for the taxpayer—the contractor takes the risk and the taxpayer knows in advance what the cost or premium will be. When the job is done by government forces, the taxpayer takes the risk—he can only hope the project cost will be kept within the estimate.
- (3) Contractors develop the new methods and new equipment that later become standard for local highway departments. It's this continual search for better equipment and methods that has so greatly reduced construction costs in America.

National or state headquarters of the various AGC groups might well develop these and other arguments further, release them to all members for use in speeches and ads.

A good public relations campaign should be continuous. Properly planned, it need cost very little, yet can do you and the contract system a world of good. Now, when both the public and government have turned to private enterprise for efficient production, is the time to start your public relations program.

Help Promote

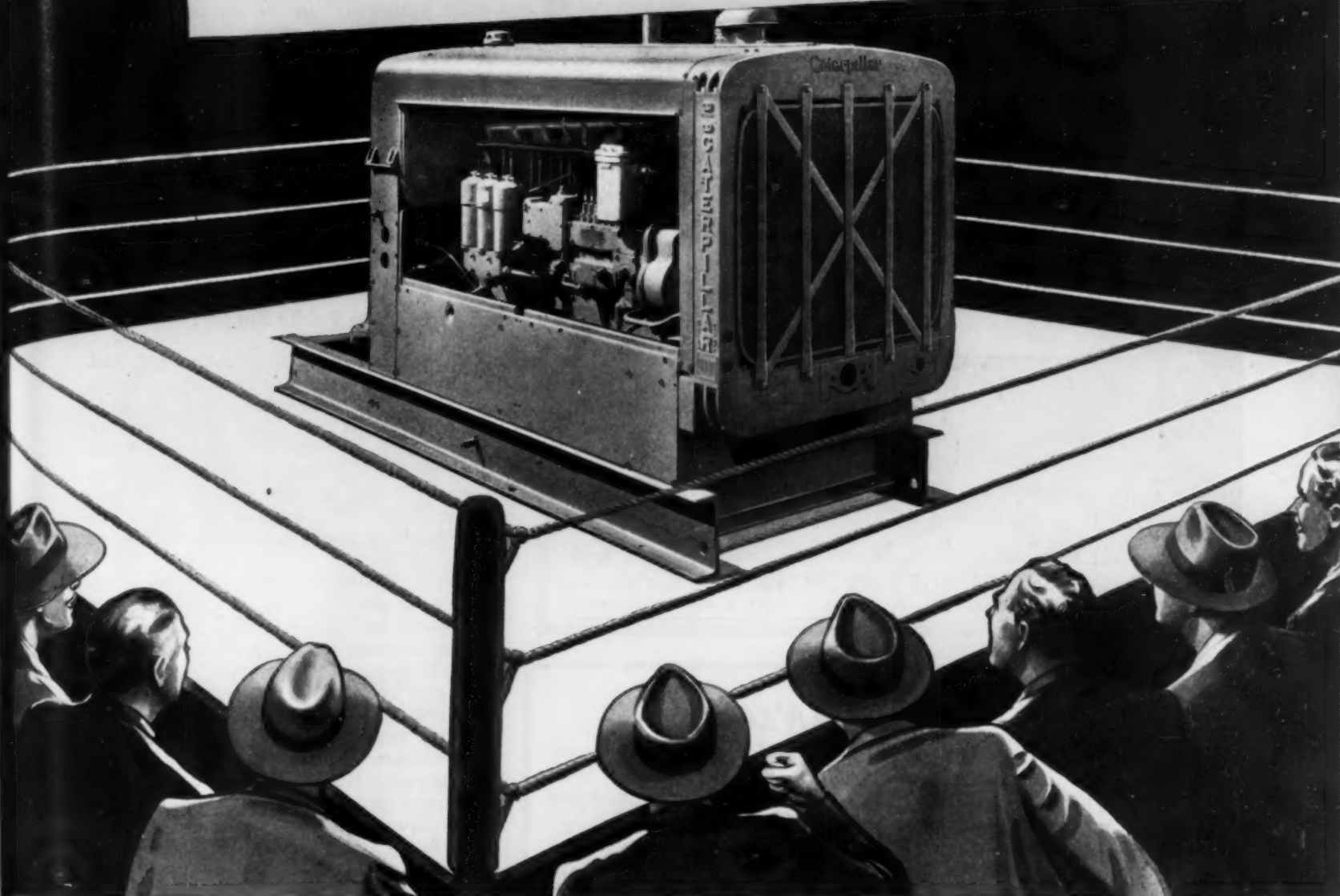
ARBA Post-war Program

Since writing the foregoing, the American Road Builders' Association has held its Chicago conference, which was well attended by both contractors and highway officials. To make the plans discussed there fully effective, every community will have to take steps now to get its plans down on paper, ready for

(Continued on page 154)

**Give more — our fighting men
need more — give to your Red
Cross**

BARE-KNUCKLE CHAMPION



THE "Caterpillar" Diesel Engine is all-time bare-knuckle champion in its class. It packs more power and can take more punishment than any other heavy-duty engine of its size.

No other Diesel built can match the simplicity of this engine — important now, when skilled operators are scarce. It's as nearly fool-proof as an engine can be made. There are only three simple operating adjustments—valves, fan-belt and water pump.

From fan to flywheel, the whole engine is "Caterpillar"-built. The fuel system is typical of sound "Caterpillar" design and construction. It requires no adjustments whatever. It can burn any type of fuel that's handy, from cleaned crude oil out of a pipeline to high-octane gasoline. And its fuel economy is famous the world over.

"Caterpillar" Diesel Engines are built for full-load, full-time work —

for more productive hours on the job and longer life. They have positive protection against dust, mud and water.

Ease of servicing is a big factor in their favor. Every part that is subject to wear can be replaced with a minimum of labor and expense.

Because "Caterpillar" Diesel Engines are used to power so many different types of equipment—such as excavators, compressors, crushers, locomotives, gravel plants and rollers—it is possible to standardize on them and thus reduce service and operating costs. And they can be hooked up in multiple installations with no loss in

efficiency and definite advantages in work output.

Right now, "Caterpillar" Diesels are contributing millions of rugged horsepower to winning the war. With the coming of victory, our full production will once more be available for peacetime jobs. In the meantime, your "Caterpillar" dealer is fully equipped to keep your present machines in running order. Call on him for counsel and service. And if you are qualified to get a new "Caterpillar" Diesel, he will explain how you can apply for it.

CATERPILLAR TRACTOR CO., PEORIA, ILL.

CATERPILLAR DIESEL

REG. U.S. PAT. OFF.



TO WIN THE WAR: WORK—FIGHT—BUY U. S. WAR BONDS!

THE SYMBOL AMES
Since
1774 **OF PERFECTION**

in Shovels

For one hundred and seventy years, the name "Ames" has stood for perfection in shovels. From a humble beginning "Ames" has grown with America and is known around the world as a leader.

Today you will find "Ames" the most complete line of shovels available. Plain Back, Solid Shank and Hollow Back types, each supreme in craftsmanship, outstanding in value and unequalled in service.

So, let "Ames" build your post-war shovel business!

RAM

★

RED EDGE

★

KNOX ALL

★

BRONCO

★

COLT

★

OPTIMUS

★

PEERLESS

★

FAVORITE

★

"AMES" BRANDS

MONONGAH	CARTER	O. AMES	TWO STAR
PINNACLE	HUSKY	PONY	THREE STAR

Parkersburg, W. Va.

AMES BALDWIN WYOMING CO.

North Easton, Mass.

SHOVELS • SPADES • SCOOPS • FORKS • HOES • RAKES • POST HOLE DIGGERS

SPEEDY UNLOADING

and REHANDLING




The world has been amazed at the unprecedented speed at which our troops are landed and casualties evacuated to hospitals.

Impressive, too, is the remarkable speed with which Owen Buckets operate—taking capacity grabs of material quickly and discharging them speedily—handling great yardage at lowest cost.

THE OWEN BUCKET CO.

6020 Breakwater Avenue Cleveland, Ohio

Branches: New York Chicago Philadelphia Berkeley, Cal.

OWEN BUCKETS

A NORTH OCEAN BUCKET AT EVERY SITE

(Continued from page 152)

bidding. I believe contractors can help. Here's how:

Many states and counties look on post-war planning as something for others to do. Make a survey of the highway officials you know to see what they are doing. Have they made a list of projects that should be undertaken when war ends? If so, are they preparing blueprints and specifications so the projects can be begun immediately after war ends? If not, why not?

In many cases, you'll probably find a feeling that there's no hurry; in others, a willingness to go ahead, but a shortage of help for surveying, drafting, estimating, etc. In either case, you can help—and you owe it to yourself to help.

Win Public Support

Volunteer to serve on such local and regional post-war planning committees as you feel could benefit by your estimating and engineering skill. Remember, by your practical advice you frequently can keep committees from suggesting impractical and unprofitable community projects, which all too often tend to make the public regard post-war planning as dream stuff.

Let luncheon clubs know you're available as a speaker. Then develop a sound, down-to-brass-tasks talk. Choose a down-to-earth title, say "Practical Post-war Projects for Pottstown", "Post-war Projects That Pay".

Work up a few pertinent statistics on gas tax revenues, savings in time, added convenience and other advantages of those regional or local projects you feel are most practical. Point out that post-war planning is concerned with both big and little projects, that it's a plan for making needed improvements, not a movement to foster visionary programs. Talk some about both on-site and off-site employment these projects will provide—base this part on your experience.

You might talk some, too, about how advances in equipment and methods will make possible quicker, cheaper completion of projects. And don't forget to tell the contract-system story. Your AGC organization can supply you with data on a government survey which proves conclusively the economy of the contract system.

Engineering Help

With federal construction slowing down, many of you are entering a slack period. Why not talk to highway officials about the possibility of using your engineers and estimators to help overcome their manpower shortages. Perhaps your AGC chapter could pool its manpower resources and figure out how the services

(Continued on page 157)



Going Places !

The U. S. Navy built thousands of mammoth Landing Boats for invasions all over the world. This L. B. with its gaping doors, measures 375' long, displaces 5,500 tons. Protected by rapid-fire guns. Shallow draft for beaching. Transports, jeeps, trucks, tanks, field pieces, bulldozers, supplies and food.

The top illustration is the artist's conception of the L. B. (beached) showing troops and war equipment disembarking. Other sketches show Gar Wood war equipment: Cargo and troop body, Gun Carriage, Dump Body, Bulldozer, Wrecker Crane, Refueling Tank and Patrol Boat.

Bonds Contributed to Building L. B's and other War Equipment shown. • Buy Bonds. • Hasten Surrender.

GAR WOOD INDUSTRIES, INC.

DETROIT 11

MICHIGAN



Here is the Cheapest, Best Way TO BUILD FILLS



PROPOSED /
FINISHED
SLOPE →

1ST LIFT

2ND LIFT

PROPOSED /
FINISHED
SLOPE →

3RD LIFT

4TH LIFT

PROPOSED /
FINISHED
SLOPE →

5TH LIFT

FINISHED
SLOPE →

LEVEL AND FINISH

In starting a fill, it is always best to build up the two outer edges first to conform with the desired slope line.

Then spread one extra lift on both sides, compacting the material as close to the outer edges as possible.

Next fill the center and repeat the cycle, keeping the sides high and the center low as you carry the fill upward.

When you reach the top, fill in the center, level off by dragging your scraper blade and finish to required grade.

Don't Be Fooled By "Gypo" Parts!

Our job—and yours—is to keep your present LaPlant-Choate equipment working efficiently until final Victory is won. Therefore, don't be fooled by substitute, makeshift parts being offered today through questionable sources. For your own protection, use only Certified LaPlant-Choate parts available through your LaPlant-Choate "Caterpillar" distributor.

★ Remember when the only way to build fills was to dump dirt in a pile with one kind of equipment—and spread it with something else? Now the complete job—digging, hauling, dumping and spreading—is done entirely by LaPlant-Choate "Carrimor" Scrapers. It's faster, cheaper, better because you can carry lifts to any desired depth . . . compact the fill and carry the slope at the same time. In addition, you can use "Carrimors" for leveling and rough finishing—thus releasing less adaptable equipment for other work. See your LaPlant-Choate "Caterpillar" distributor or write: LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa.

LAPLANT-CHOATE

Earthmoving and Land Clearing Equipment



(Continued from page 154)
should be paid for. The offer of such help can be worth a few paragraphs in the local newspaper, if you take time to let the editors know about it.

Finally, remember that anything you can do to speed projects to the blueprint and bid stage is going to aid your own post-war prospects for profit-making jobs. In short, you can make this a paying public relations project for yourself.

★ ★ ★

CONSTRUCTION IN PERSIA

(Continued from page 64)

arrived safely and were operated 24 hr. a day, barring breakdowns. The method of operation can be noted in an accompanying photograph. The value of these machines was immeasurable, particularly when it is realized that one machine using a crew of four Americans, could do in 24 hr. at least the amount of work that 600 "coolies" could do in the same time. With only two machines available, however, the value of the native labor must be considerable. It can be imagined that the repair gang for the graders knew intimately every inch of the conveyor belts on the graders for, with no spares, the belts were patched and repatched until finally only one belt could be made up. When that belt was finally beyond repair it had almost as much metal as rubber holding it together.

(3) At the start, draglines and carryall scrapers were utilized to place fill, but when a sufficient quantity of material was in place these units were organized to follow behind the elevating graders, finishing the rough work completed by the latter.

Flood Prevention

Though this area, through the major portion of the year, received no rainfall, the matter of culverts was extremely important to provide for the period of rains and flood waters from the rivers. Approximately 1 ft. below the desert floor lay a stratum stream of dense, dry, impermeable clay, which prevented any appreciable drainage into the ground. As the area was of almost billiard-table flatness, there could be no surface runoff. Consequently, water disappeared mostly by evaporation, and lay in pools until this took place. It might also be noted that the top 12 or 15

(Continued on page 158)

in the foreground of tomorrow's

Airport Construction Picture...



Low Cost Water by Carver

Under tomorrow's competition, the hours and dollars you can save with a Carver Certified Centrifugal for supplying water or dewatering excavations will be an important item.

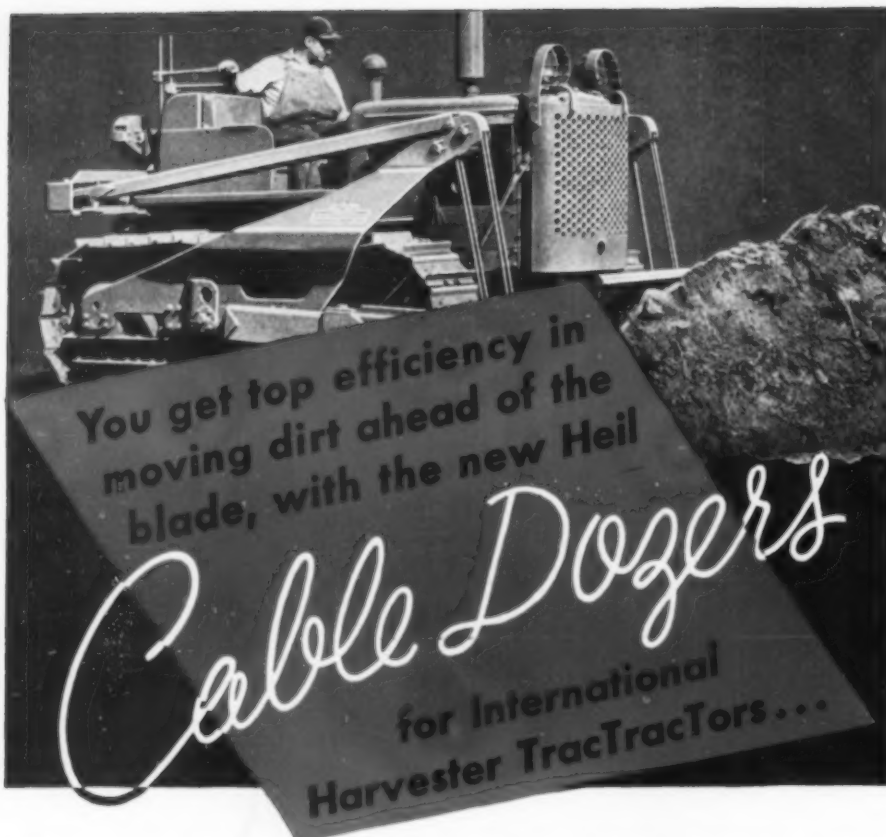
When the time comes to sharpen your pencil for close bidding on that big airport job, remember CARVER . . . the battle-proved construction pump that takes mud, sand or grit in its stride, that stays on the job longer to move water at less cost!

Get the facts from your nearby CARVER distributor, or write us now for your copy of the new CARVER catalog.

THE CARVER PUMP CO.
Muscatine, Iowa

CARVER CENTRIFUGAL
Certified PUMPS





This new equipment is designed to give perfect balance with International TracTractors, so that the full power of your tractor drives on the blade—moving more "pay dirt" with each load.

In every way, tractor and equip-

ment work together in a perfectly matched team. The simplified mounting does not obstruct the operator's view, but gives him full, free vision ahead. Note the convenience of the controls which are adjustable to his reach.

The machine "feels right"—performs smoothly, gives fast, positive action under the toughest conditions. Send for bulletin describing many other features which assure you of outstanding performance at lower cost.

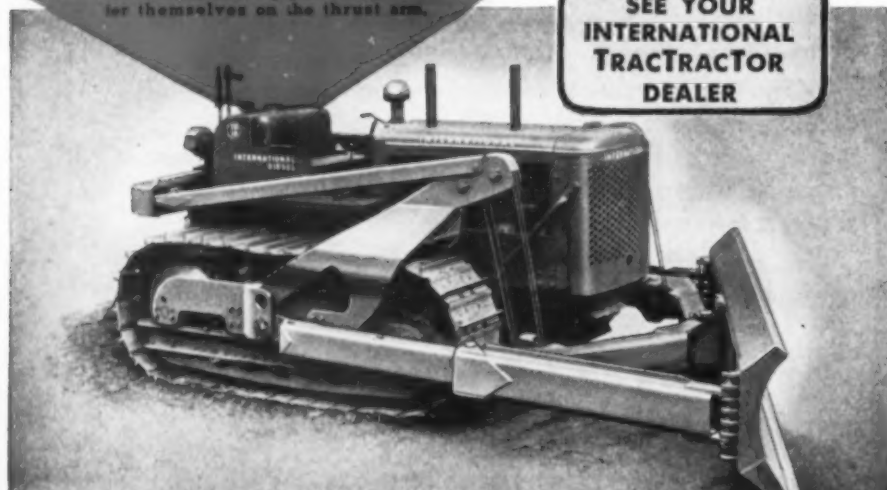
R-23

Angling the blade is quick and easy...

One man can do it in less than 5 minutes

The angling adjustment is equipped with slides that are especially easy to adjust, since they practically center themselves on the thrust arm.

SEE YOUR
INTERNATIONAL
TRACTRACTOR
DEALER



THE HEIL CO.

GENERAL OFFICES

MILWAUKEE 1, WISCONSIN

(Continued from page 157)

in. of silt absorbed water, and became a slimy mess after a short rain, so that travel across the desert was impossible during this period except in the four-wheel-drive Army "jeeps" and "peeps," which proved their exceptional value under these conditions. To prevent the ponding of water on one side of the fill it was planned to place approximately three culverts every mile. Reinforced concrete pipe of 24-in. diameter was used for this purpose and at the close of our operations more than 25,000 lin. ft. of pipe, in 3-ft. sections, had been built.

Other steps planned to fight the possible flood menace were as follows: Dikes were to be constructed at right angles to the fill to prevent flow of water in the borrow pits and consequent erosion of the fill. Approximately every mile, water holes 20 to 30 ft. in diameter were excavated down to ground water level 20 ft. below the desert floor, the purpose being to provide the only possible means of aiding the water to run off.

Bridge Building

Bridges were located at all river crossings, and were built mainly of reinforced concrete and structural steel. It is an interesting note that much of the structural steel used temporarily in the construction of New York City's Sixth Ave. Subway, recently completed, is now a permanent part of bridges in Persia. Because shipment of this steel was due to the forethought of the late George Paaswell, originally chief engineer of the project, and well known as an able and eminent engineer by construction men throughout this country, the most monumental of these bridges has been named "Paaswell Bridge." Mr. Paaswell died in Persia before he could see any of the fruits of his work.

Construction Difficulties

A difficult problem was that of providing a base for the southern part of the road, the reason being that the average haul by truck was approximately 55 mi. from the only source of stone or gravel. Though a railroad ran parallel to the new road, it was a single-track line used to haul goods bound for Russia to the north, and could not be blocked. This difficulty could have been overcome by constructing sidings, but there still was the problem of providing railroad cars, which were as easy to obtain as tenderloin steaks—which we never tasted. This part of the paving work had not been started when the constructor's forces were relieved by Army personnel.

Though the above described work

would have been a series of simple problems in the United States, the location and limited means of communication in Persia rendered it particularly difficult. Consider that the source of supply was thousands of miles away, that the need for speed caused operations to be only a few days behind the engineering and plans, that any local materials had to be explored for and developed, and that the work was being done in a strange country not yet exposed to modern methods.

The problem of providing plant was naturally most difficult due to the lack of knowledge of actual requirements, the necessity for planning for all contingencies, and the poor communications facilities. Approximately 40,000 measured tons of plant reached the base, consisting of such items as 20 cranes, dump trucks with a total capacity of 1,300 cu.yd. 40 bulldozers, 20 semi-trailers, gasoline tank trucks, rock crushing and asphalt plants, 6 piledriving rigs, 2 diesel tugs, plus a quantity of welding machines, air compressors, graders, generators, etc. Sufficient amounts of spare parts had to be provided for each machine.

The need for standardizing equipment on a project of this sort can be noted by the fact that a fleet of 6 Koehring Dumpers required a complete set of spare parts to be moved around with the trucks. This naturally involved a great amount of additional work for the 24-yd. capacity involved. Had this equipment been similar to the rest of the truck units or had there been more of the Dumptor type units in the fleet, the necessary expense of moving the parts would have been minimized.

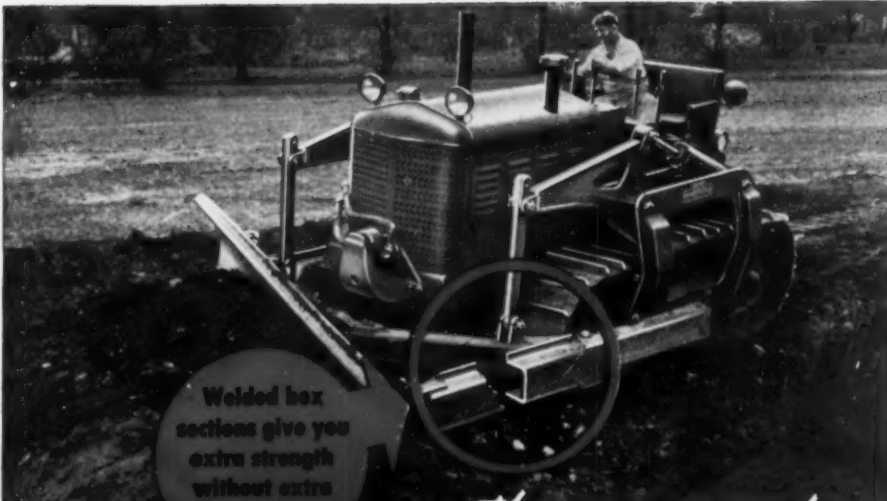
As it was, however, an enviable record was made in the movement of a total of 4,300,000 cu.yd. of fill, placed by various methods, and better than 780,000 cu.yd. of sandstone or base materials quarried, transported, processed and placed. This work is particularly noteworthy when it is realized that the bulk of the work was done in three months, beginning in September, when a satisfactory quantity of plant and men were available.

Native Labor

Native labor was an extremely important factor. At times there were as many as 6,000 natives on the payroll, performing as houseboys, mess boys, carpenters, laborers, truck drivers, mechanics, clerks. Their pay ranged from approximately 30c.

(Continued on page 160)

Be with your boy over there by
giving over here to your Red
Cross



Welded box sections give you extra strength without extra weight

...another reason why

HEIL Hydraulic Bulldozers and Trailbuilders

stand up dependably
...and take the tough
jobs without wavering

Heil engineers and fabricators have pioneered the modern practice of replacing heavy members with welded box sections that are lighter, stronger, and easy to repair in the field without costly delays. The advanced design of Heil equipment assures you of more speed . . . greater flexibility . . . and ability to push through when the going is tough. Because they're tailor-made to Cletrac Tractors, you get full visibility for safe, efficient handling.

The Trailbuilder blade is easily angled to right or left for side-casting new cuts. Bulldozer blade takes rocks and stumps without changing pace.

The Heil hydraulic system comes close to a perfect leak-proof unit—stays in adjustment and gives a minimum of trouble.

For full loads and more yardage per day and per year — at lower cost — use Heil Earth-moving equipment.

Write for bulletins.

R-24

SEE YOUR
CLETRAC
TRACTOR
DEALER



ARMY E NAVY

THE HEIL CO.

GENERAL OFFICES • MILWAUKEE 1, WISCONSIN

PARSONS



When desired a conveyor extension may be added to facilitate loading higher trucks or keep spoil bank farther from trench.



QUICK SHIFT CONVEYOR

The arc type discharge conveyor on a Parsons Trencher shifts through the machine by power so that spoil may be deposited on either side of trench as desired by the operator. This shift may be made in less than fifteen (15) seconds so that an obstruction can be cleared while machine is digging—a most important feature when operating in close quarters. The shift is by worm and worm gear which automatically locks conveyor in any position.

The conveyor is permanently located for height and does not vary when boom is raised or lowered. Trucks may, therefore, be loaded at fixed position discharge height.

The spoil to be retained for back-fill is piled on opposite side of trench by merely moving a lever to reverse the direction of belt. Investigate Parsons superiority before you buy.

THE PARSONS COMPANY
NEWTON, IOWA

TRENCHING EQUIPMENT



(Continued from page 159)

a day for the lower classes to \$3 or \$4 a day for the clerks, who spoke English. In most cases they had to be trained for the task, particularly that of truck drivers, who were used on the lighter equipment. It was particularly important to require an eye examination for these natives, as a goodly number of them were afflicted with trachoma. A simple people, they took great pride in being assigned a seemingly important task and consequently were not lax in performing their duties.

An important step in improving their efficiency was the establishment of the food ration system, noted previously. In many cases the partaking of even such a meager bill-of-fare as the regular ration every day built a man up so that his physical improvement actually could be seen.

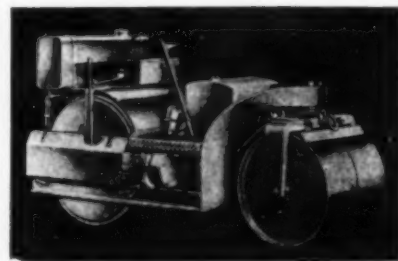
Living Conditions for Americans

American workmen during the preliminary stages of the work in Persia spent many difficult moments, but as equipment and foodstuffs arrived from the States their lot became better and better, and it is imagined that the present workers who replaced the contractors' forces enjoy such luxuries as air-conditioned

(Continued on page 164)

C.H.&E.

3 Ton Roller



For rolling footpaths, driveways, sidewalks, tennis courts, playgrounds, and general maintenance work. The forward and reverse speed is controlled by one hand lever.

We also manufacture Saw Rigs — Pumps — Hoists — Bar Cutters and benders.

Write for catalog.

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Milwaukee 12, Wis.



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EXTRA
BONDS!**

We're in a
**DIRT
MOVING
WAR!**



THIS is a dirt-moving war... *a tractor war*. Already the history of World War II is brimful of heroic jobs done by crawler tractors, equipped with bullgraders, bulldozers and scrapers. Those tractors will continue to smash their way through jungle and swamp, over mountain and plain, to Victory.

As a two-star general of the Army Engineers puts it: "Victory seems to favor the side with *the greatest ability to move dirt.*"

Munda... Rendova... the Solomons... Kiska... Sicily... Salerno... everywhere our fighting forces go, you'll find these armored giants building roads, smoothing shell-torn landing fields, pulling heavy guns, handling aircraft bombs.

The Armed Forces have first call on International Trac-

TracTors today. That's why so few new ones are available for civilian use. The new TracTracTors you need so much today, to replace badly worn equipment, are more urgently needed on the fighting fronts.

Many of your old Internationals have a lot of work-hours left in them. Keep those tractors well serviced. Work closely with your International Industrial dealer. He has the skilled service men, the well-equipped shop, and the stock of International Parts to help keep your TracTracTors plugging on the home front, backing up the military TracTracTors on the battle front.

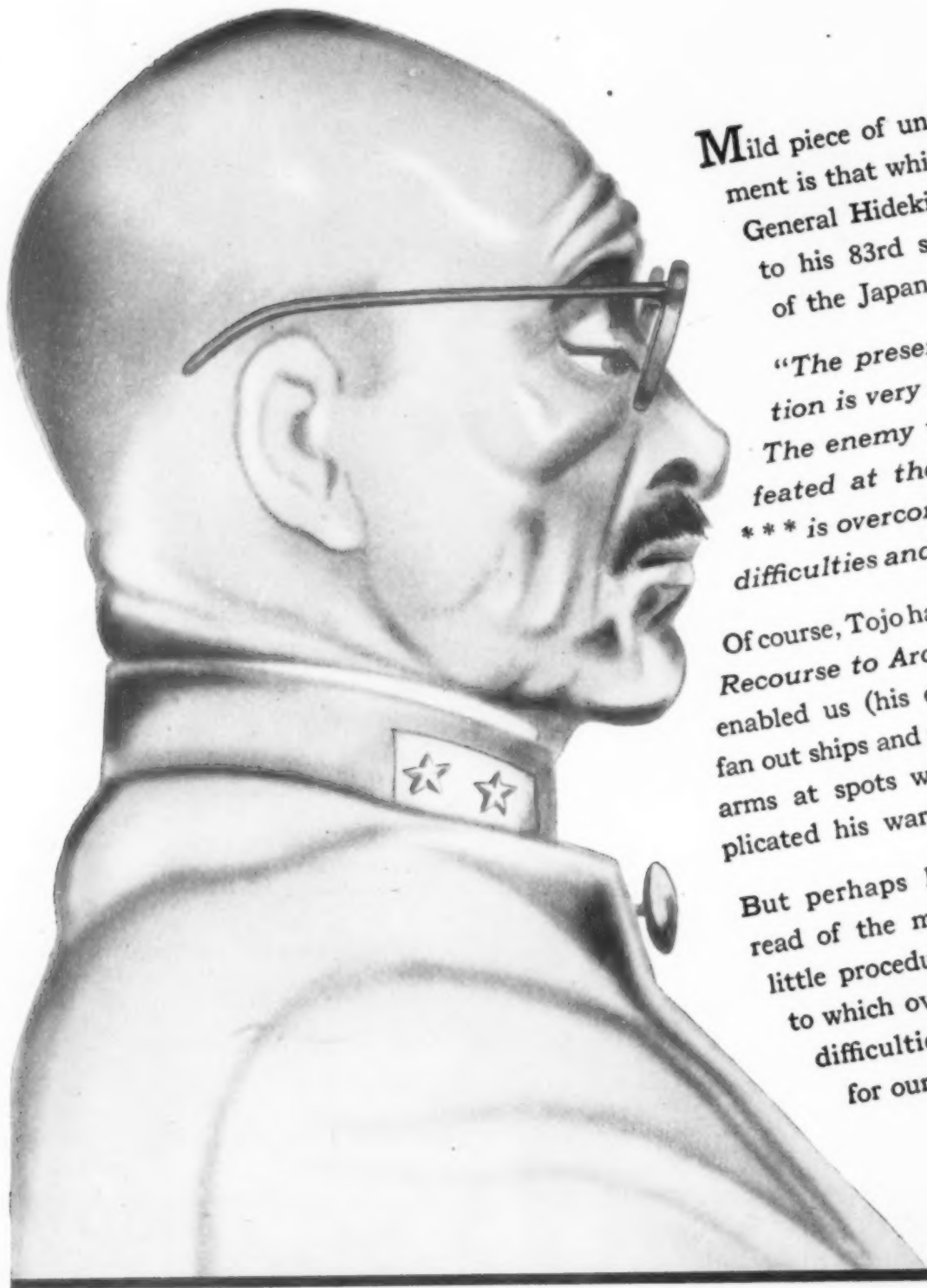
INTERNATIONAL HARVESTER COMPANY

180 North Michigan Avenue

Chicago 1, Illinois

INTERNATIONAL POWER

Then he said to himself
"VERY COMPLICATED, PLEASE"



Mild piece of understatement is that which Premier General Hideki Tojo made to his 83rd special session of the Japanese Diet:

*"The present war situation is very complicated. The enemy who was defeated at the beginning *** is overcoming many difficulties and dangers."*

Of course, Tojo has read how Recourse to Arc Welding enabled us (his enemy) to fan out ships and planes and arms at spots which complicated his war situation.

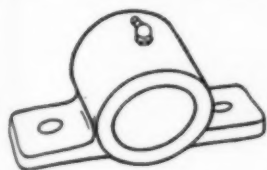
But perhaps he has not read of the mountains of little procedures, recourse to which overcame many difficulties and dangers for our production men.

"OVERCOMING DIFFICULTIES AND DANGERS"—he says

Look, Tojo: How having *Recourse to Arc Welding*, the production of war tools became *very simplified* for us . . . while their effect really made your position "VERY COMPLICATED."

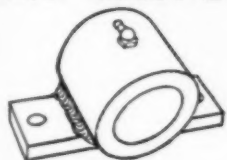
And think how in postwar they will make competition "Very Complicated" for a great many standpatters in production techniques.

VERY COMPLICATED, PLEASE



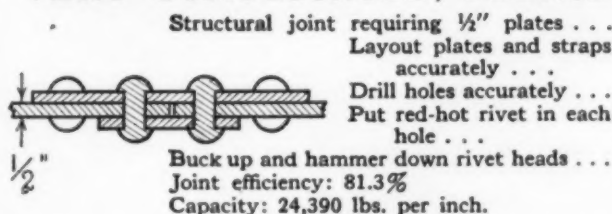
Drum shaft bearing . . .
Make pattern . . .
Mould . . .
Sand-blast . . .
(Cost in rough, \$1.05)
Bore . . . Machine . . .
Drill holes.

VERY SIMPLIFIED, THANKS



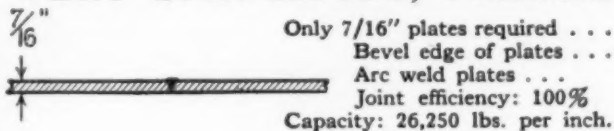
Cut strap and drill holes . . .
Saw piece of tubing . . .
Arc weld into unit . . .
Total cost \$0.50.

VERY COMPLICATED, PLEASE



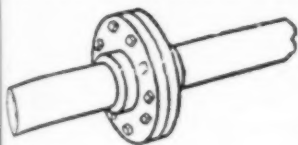
Structural joint requiring $\frac{1}{2}$ " plates . . .
Layout plates and straps accurately . . .
Drill holes accurately . . .
Put red-hot rivet in each hole . . .
Buck up and hammer down rivet heads . . .
Joint efficiency: 81.3%
Capacity: 24,390 lbs. per inch.

VERY SIMPLIFIED, THANKS



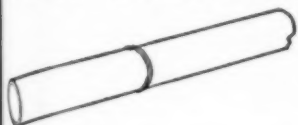
Only $\frac{7}{16}$ " plates required . . .
Bevel edge of plates . . .
Arc weld plates . . .
Joint efficiency: 100%
Capacity: 26,250 lbs. per inch.

VERY COMPLICATED, PLEASE



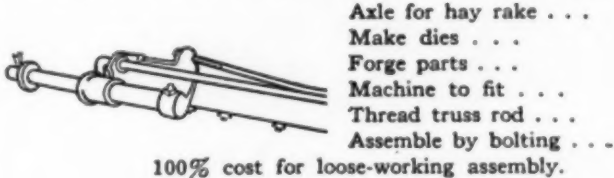
Connection in 10" steam pipe line . . .
Cut and thread ends of pipe . . .
Assemble with 2 flanges, gasket and set of bolts.
Joint requires maintenance.

VERY SIMPLIFIED, THANKS



Arc weld bevelled-end pipe . . .
A permanent, leak-proof joint.

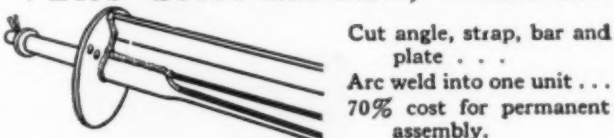
VERY COMPLICATED, PLEASE



Axle for hay rake . . .
Make dies . . .
Forge parts . . .
Machine to fit . . .
Thread truss rod . . .
Assemble by bolting . . .

100% cost for loose-working assembly.

VERY SIMPLIFIED, THANKS



Cut angle, strap, bar and plate . . .
Arc weld into one unit . . .
70% cost for permanent assembly.

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America's greatest natural recourse
ARC WELDING



★★ Immediate delivery on Gasoline Powered 1½ H.P. and wheelbarrow or round base mounted 3 H.P. units on suitable priority.

★ GREATER CAPACITY—for their size MALL Portable Vibrators place more concrete than any other vibrator.

★ HIGH FREQUENCY VIBRATION (7000 per min.) makes for greater uniformity, in strength and density of concrete.

★ PLACE A STIFFER MIX—than can be puddled by hand, eliminating honeycombs and voids.

★ INCREASE BONDING STRENGTH—with reinforcement and between successive layers.

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MALL Vibrators are ruggedly constructed for long hard usage. Vibrating elements are made of the toughest materials with special metal, welded tips designed to withstand constant abrasive action.

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MALL TOOL COMPANY

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digging rock and stone

YOU COULDN'T put this bucket on a tougher job. For years it has been helping deepen a ship channel,—digging in hard flint bottoms one day, handling rocks and stones on other days. Yet, because its lips and teeth are protected against rapid wear with Coast Metals Hard-Facing, it has been rendering outstanding performance.

Your bucket teeth, lips, runners and other parts also can be given a new lease on life by Coast Metals Hard-Facing! Or, better yet, hard-face your NEW bucket parts and they will serve ever so much better. Then, after slight wear, they can be rebuilt repeatedly and the cost and delay of getting replacement parts eliminated.

Write for "How To Make Construction Equipment Last Longer"



COAST METALS, INC.

Plant and General Offices: Canton, Ohio
Executive Offices: New York, N.Y.

COAST METALS
hard-facing
weld rods

MAKE YOUR EQUIPMENT LAST LONGER

(Continued from page 160)

living quarters and mess halls, fresh frozen foods, short-wave radios, and fresh meats.

Bombay tents, Quonset huts, grass or Nissen huts, and mud brick houses were the principal types of quarters at the inception of the work. The type selected depended on available materials and the length of time the camp was needed. For permanent quarters the Quonsets and the brick houses could be made extremely comfortable, though during the heat of summer, when the sun baked through any insulation, it was the practice to hire a native to fan one during a siesta.

Ailments such as malaria, yellow jaundice and dysentery were common, if one did not take pains to guard against them by following the directions of the Army medical men.

Skillful Army Administration

Much of the success of the undertaking can be attributed to the efforts of the Army personnel attached to the project. The skillful Army administration responsible for the preliminary work deserves special commendation. In particular, the cooperation and effort given by the District Engineer on the project, will always be appreciated and remembered by the civilian members of this group.

The unsung heroes of the project were the group in the New York office, who, with a minimum of knowledge of the actual conditions, had the extremely difficult task of providing equipment, supplies and manpower in proper quantities and sequence. A breakdown at that point could have caused delays of months, but, looking back, the members of this force can also take pride in a job well done.

The project described is one of the great improvements in Persia made possible by modern organization and equipment, which were earlier applied in the developments of its oil wealth by outside interests. The first step taken some years ago, was the construction of a railway through the mountains in the north by German and American contractors.

Persia's Future Development

The future development of Persia, however, should require many more improvements. The masses of the Persian people are now encountering the luxuries of our western world and, becoming accustomed to them, will find need for irrigation projects, water supply and sewerage systems, highways and railroads. Education and sanitary improvements in future years will transform a people of great promise—a people from the same racial source from which we Americans also stem. If the resources can be found to finance such improvements, they will certainly be forthcoming after the war.

THIS IS AMERICA



Land of inventive genius and productive skill and business enterprise. This is America! ★ As one of America's basic industries, Raybestos has kept pace with American progress . . . achieving leadership in the production of advanced brake linings and clutch facings for the four great fields — Automotive, Heavy Duty, Industrial and Aircraft. ★ Today, out of this leadership and the rigorous proving ground of war production, are coming for you — and will continue to come — Raybestos friction materials exemplifying that progressiveness which says, "This is America! This is Raybestos"!

THE RAYBESTOS DIVISION of Raybestos-Manhattan, Inc., BRIDGEPORT, CONN.



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Manufacturing the most complete line of highest quality metallic and non-metallic brake linings and clutch facings for every type of equipment, war and civilian. Also fan belts and hose.

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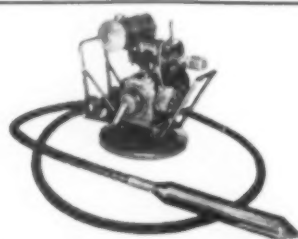
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out dozer equipment.

W-141, Construction Methods
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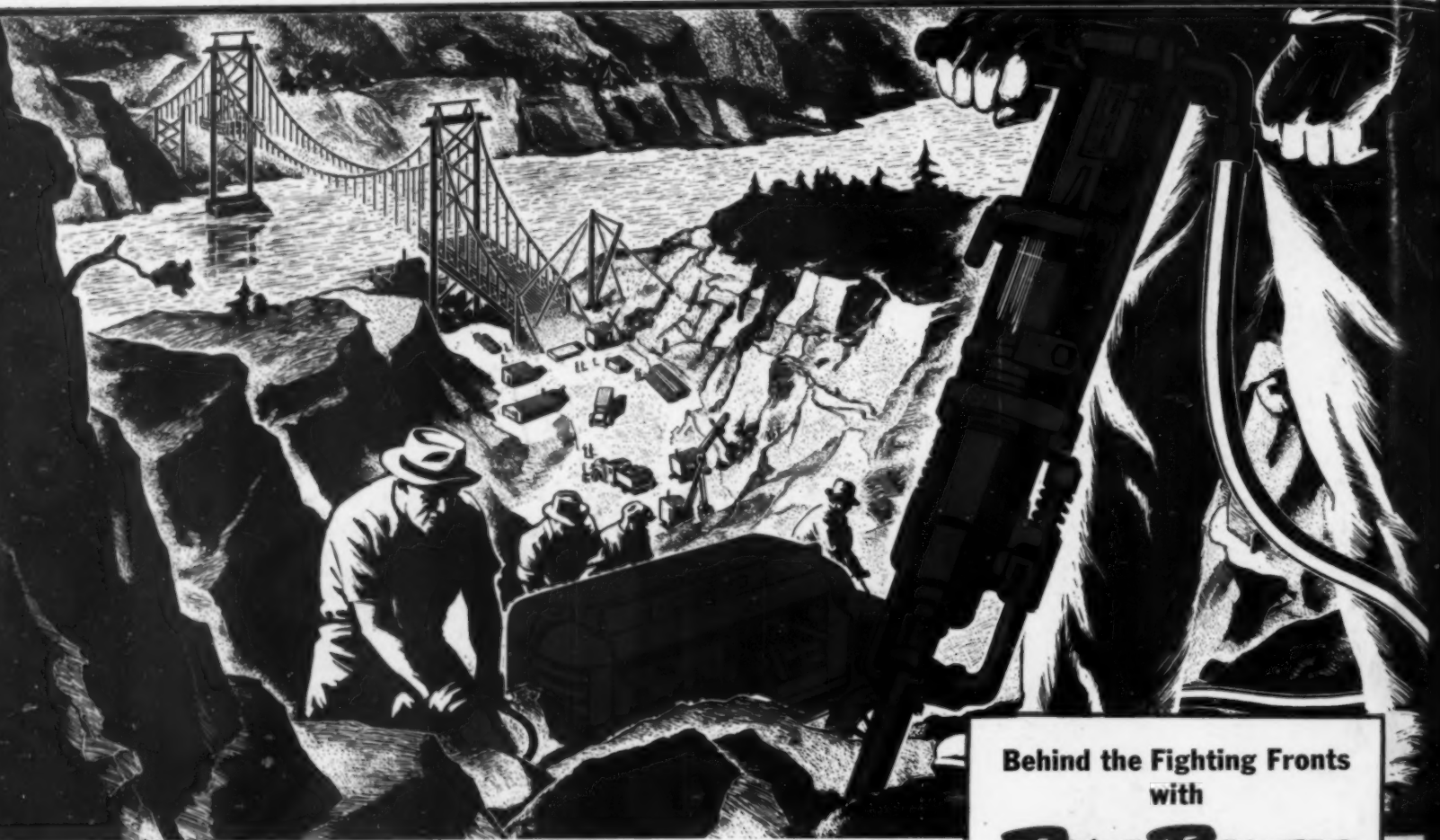
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with

BLUE BRUTES

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